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Middle Bronze Age- Late Bronze Age Transitions in the Southern Urals (Russia). Case Study: Shifts in Settlement Patterns in the Kyzil Area, Chelyabinsk District.

denis sharapov
Georgia State University

MIDDLE BRONZE AGE – LATE BRONZE AGE TRANSITION IN THE SOUTHERN URALS (RUSSIA). CASE STUDY: SHIFTS IN SETTLEMENT PATTERNS IN THE KYZIL AREA, CHELYABINSK DISTRICT.

by

DENIS SHARAPOV

Under the Direction of Jeffrey Glover

ABSTRACT

The following paper focuses on the transitional period between the Middle Bronze Age (MBA) and the Late Bronze Age (LBA) in the Southern Urals, Russia. GIS-based analysis of Bronze Age settlement patterns in the Kyzil Area points to a number of important findings. The study concludes the demographic impossibility of an autonomous development scenario of the Sintashta – Srubnaya-Alakul cultural transformation, rejects the presence of 'proto-city' or urbanization developments in the region during the Bronze Age, and points to the shift to a more collective form of control over natural resources during the LBA period. The study also examines the spatial distribution of 'kurgan' cemeteries in the area. Among other things, this thesis illustrates how settlement pattern studies can add to and complement the heavily burial data - driven research, often relied upon in the archaeological analysis of the Eurasian Steppes.

INDEX WORDS: Bronze Age, Urals, Settlement patterns, GIS, Russia, Sintashta, Kurgans

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DENIS SHARAPOV

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DENIS SHARAPOV

Committee Chair: Jeffrey Glover

Committee: Jeffrey Glover

Zachary Hruby

Bryan Hanks

Electronic Version Approved:

Office of Graduate Studies

College of Arts and Sciences

Georgia State University

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1 Introduction

1.1 Purpose of the study and the expected results

The following paper addresses the period of transition from the Middle Bronze Age (MBA), 2500-1800 BC, to the Late Bronze Age (LBA), 1800-1500 BC, (Koryakova and Epimakhov 2007) in the Southern Urals region of Russia (see *Figure 1.1*) by relying on settlement pattern data. The Bronze Age, being a pivotal period in many aspects of the Eurasian Steppes' prehistory, had served as a precursor to the emergence of social complexity in the region (Renfrew 2009:XV). The MBA-LBA transition is a period characterized by significant changes in many aspects of life for the dwellers of the steppes, in general, and of the Southern Urals region, in particular. In culture-historical terms, the MBA Sintashta archaeological culture got replaced by the LBA Srubnaya-Alakul cultural complex, with Petrovka cultural development representing a transitional stage between the two (Koryakova and Epimakhov 2007). One major change taking place in the region during this part of the Bronze Age has to do with settlement practices. The following analysis aims to shed light on the MBA-LBA transition by examining the changing types and locational distributions of the Southern Urals' Bronze Age settlements.

Most of the archaeological data dealing with the Bronze Age in the Eurasian Steppes comes from the burial context (Kohl 2007:16), which is due in part to the historical traditions of Russian archaeological school. The following study examines the MBA-LBA transition from a slightly different perspective when compared to most of the archaeological literature published on the subject to date. Examining settlement (vs. burial) evidence through employing methodologies such as Geographic Information Systems (GIS), is relatively new to the

archaeology of the Southern Urals. The settlement pattern analysis of Bronze Age settlements in the Southern Urals has been limited to identifying individual sites through areal photography remote sensing technique and creating basic regional settlement distribution maps (Zdanovich et. al 2003). Utilization of GIS, a leading interdisciplinary tool capable of interpreting, analyzing and displaying spatial data, offers a great potential for expanding the analytical component of the settlement pattern research in the Southern Urals. The ability of GIS' techniques to integrate various theoretical developments in archaeology into spatial analysis, such as postprocessual notions of landscape phenomenology, combined with tremendous quantitative and graphical capabilities of this digital tool, can add to our understanding of the Eurasian Bronze Age prehistoric dynamics.

The following work compares the historical trajectories of the Russian vs. American schools of archaeological thought; examines the changing perspectives in settlement pattern research and GIS-based spatial analysis; outlines the overall Bronze Age dynamics in the Southern Urals; and highlights the hypotheses put forward by other archaeologists regarding the MBA-LBA transition in the region. Finally, this paper focuses on the Kyzil Area case study, which employs a number of GIS-based methodologies to analyze the MBA-LBA transition from a settlement pattern perspective.

Among the specific research questions addressed in this thesis are : the level of directness of cultural and demographic continuity between the MBA Sintashta-Petrovka and the LBA Srubnaya-Alakul populations through paleodemographic estimates based on settlement evidence; the level of possible 'proto-city' formation or urbanization processes taking place in the Southern Urals at various stages of the Bronze Age; the influence of regional

natural resource distribution patterns on Bronze Age settlement location choices. Finally, the Kyzil Area case study, outlined in chapter six of the thesis, evaluates the possible roles played by kurgans (burial mounds) in the lives of the people of the steppes by examining the distribution patterns of this ritual landscape component in the Kyzil Area.

1.2 Southern Urals: geography, ecology, and climate

The Southern Urals region is located in present-day southern Russia. The region encompasses territories adjacent to the southern part of the Ural Mountain range, which stretches through the northern part of the Eurasian continent, bordering on the West Siberian Plain in the east and the North European Plain in the west (see *Figure 1.2*). Although purely nominal in nature and lacking a distinctive boundary, the geographic area surrounding the Ural Mountains is oftentimes referred to as "the Urals", with the term being used in various contexts. The term "Urals" is generally imbedded with a certain level of common geographic, cultural, economic and historical heritage, shared by the inhabitants of the region. Although officially, there is the Urals Federal District of Russia and the Urals Economic Region, geographic borders of which vary, there is no clear-cut definition of what territories exactly constitute the Urals.

The Southern Urals region, as it is defined for the purposes of the following research, is located within the Eurasian steppe and forest-steppe ecological zones. Eurasian Steppes is the term used to describe a continuous belt of open grasslands running through the center of the Eurasian continent and stretching from the north of the Black Sea in the west, to Mongolia and Northern China in the east (see *Figure 1.1*). The Eurasian Steppes are bordered by the broad-

leaved and boreal forests in the north and the deserts of Central Asia in the south (Kremenetski 2003:11). Although the Eurasian Steppes region encompasses vast expanses of land, with different areas' climates varying to a certain degree, overall, the climate of the steppes tends to be semi-arid and continental, characterized by vast differences between the cold winter and hot summer temperatures (Kremenetski 2003:11). In the Southern Urals, in particular, the average monthly temperatures are -15˚C in January and +20˚C in June (Chibilyov 2002).

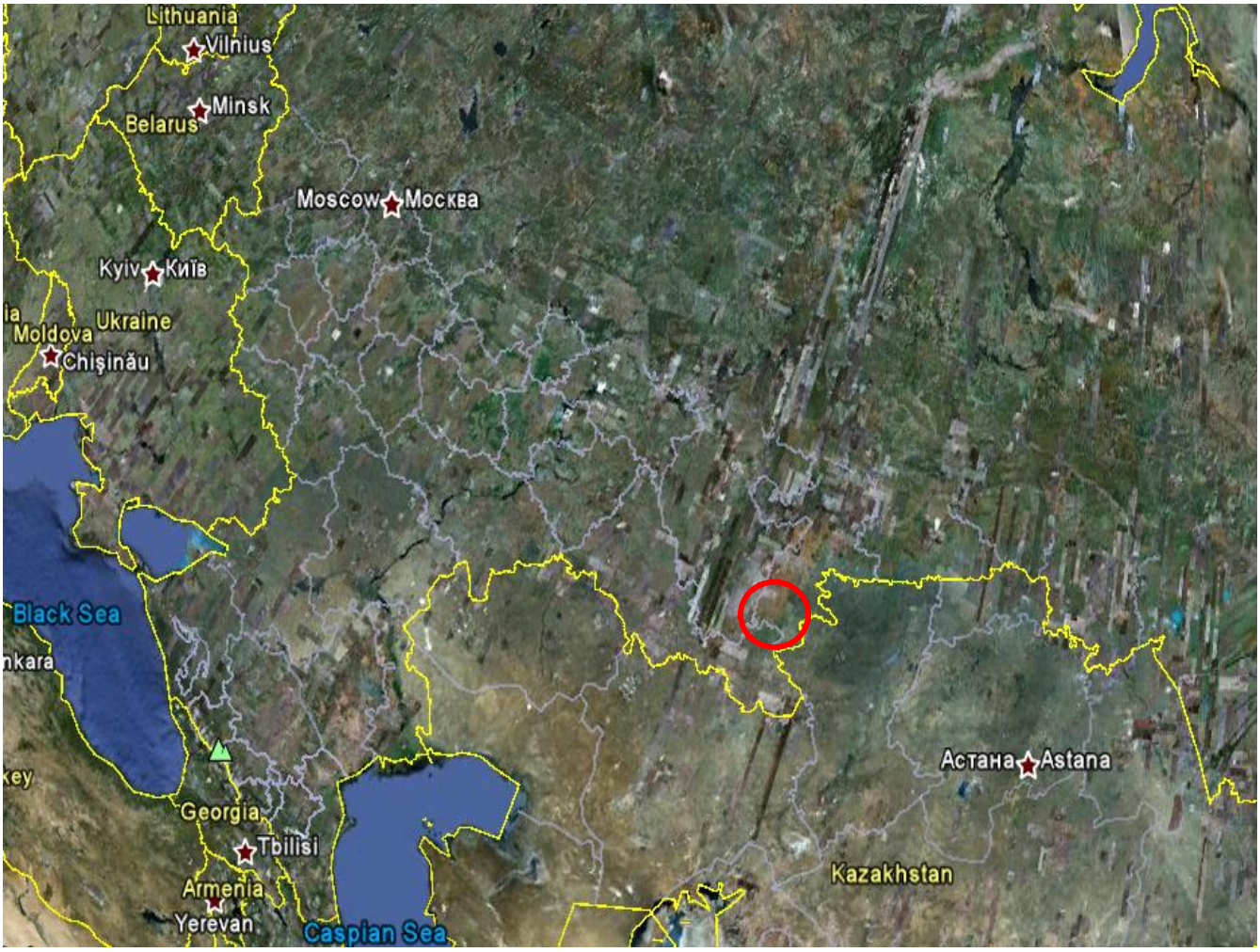

Figure 1.1 Southern Urals. Red oval denotes the location of the Southern Urals Region (adapted from Google Earth @ 2001 Europa Technologies).

The geography of the Eurasian Steppes is characterized by varied relief. Generally, the topography of the region is characterized by relatively flat surfaces, including extensive plains,

low river valleys, flat plateaus, and low hills (Chibilyov 2002). The geography of the Southern Urals is somewhat distinct due to a couple of factors. The region is located close to a steppe – forest-steppe border (Zdanovich and Batanina 2007), which makes it more forested, compared to other areas of the steppes. Also, being located in proximity to the Ural Mountain range, with the Southern Urals steppe landscape sitting on top of an ancient mountain surface (Sygov 1968), the area may at times feature a number of hills or uneven surfaces. While the topography of the area under study will be discussed in more detail in the subsequent sections, it is important to note that the physical landscape of the Southern Urals is far from being a uniform, perfectly flat grassland, which is how some tend to picture the steppes.

Figure 1.2 The Eurasian Steppes . Red oval denotes the location of the Southern Urals Region (Source: Encyclopedia Britannica).

The Urals, both the mountains as well as the adjacent steppes, are famous for high concentrations of minerals, including ores (iron, copper, gold) and a variety of semiprecious stones (jasper, crystal, malachite, agate, etc.) (Koryakova and Epimakhov 2007:4). The copper ore deposits of the Southern Urals were mined by the local populations since the prehistoric times. The Southern Urals Kargaly mine, for instance, which will be discussed in more detail in later chapters, according to Chernykh (1997a) was the biggest metallurgical complex in prehistoric Northern Eurasia. The mineral wealth of the Urals was part of the reason why the archaeological heritage of the region became available to western scholars fairly recently, with the region being a closed Soviet military zone until 1991 (Koryakova and Epimakhov 2007:XXI).

2 Russian vs. American archaeology

Most of the archaeological work done in the Southern Urals has been done by the Soviet, and later Russian scientists. Needless to say that Russia and the United States are as unsimilar as any two countries can be, with differences oftentimes crossing over into the realm of academic disciplines, such as archaeology. Since this paper is written by a bearer of Western archaeological tradition, it is important to be aware of the vast differences between the American and Russian schools of archaeological thought. Relying on Russian archaeological literature and at the same time utilizing Western theoretical concepts and methods calls for a heightened awareness of what archaeology means and how it is practiced in both countries. The following chapter provides a brief overview of the discipline's historical trajectories in Russia and in the United States, outlining the resulting differences in theoretical perspectives and methodological practices between the two schools of thought. Special attention is paid to the implications of different methodologies in the Eurasian Steppe region in general, and the Southern Urals in particular.

2.1 Historical trajectories

2.1.1 North America

When discussing the archeology of the Unites States, it is important to note that many of its features are characteristic of the Anglo-American theoretical paradigm, prevalent on most English-speaking nations, including the United Kingdom, Canada, and Australia, among others (Kohl 2007:3). Throughout history, American and British archaeologists, in particular, have been involved in a great deal of theoretical dialogue, thereby building the foundation for what

today is referred to as 'Western' archaeological thought. This process of scholarly exchange and playing off each other's ideas is still taking place today, although archaeological research in each Anglo-American country is carried out in the political context of a given nation (Kohl 2007:3). While the following section focuses on the trajectory of archaeological thought in the United States, many theoretical developments discussed below are characteristic of Western archaeology in general.

Early archaeological pursuits in the Unites States start in the late 1700s early 1800s with the excavations of Native American "Mounbuilder culture" sites. At that time Americans of European descent were expanding westward and seizing resources from the native populations, who were seen as evolutionarily inferior and aggressive people who must have wiped out the earlier mythical 'Moundbuilder' civilization (Trigger 2009:161). The theoretical stance at the time was that of antiquarianism mixed with a unilinear evolutionary paradigm that justified the colonial expansion.

Archaeologists in the United States adopted the cultural-historical approach at the start of the 20th century (Trigger 2009:278). American archeologists started geographically and temporally outlining distinct material culture manifestations. At the time, the Boasian approach that stressed cultural relativism and opposed racism, started being applied to how Native Americans were viewed throughout prehistory, although, overall, American archaeology did remain "colonial in spirit" (Trigger 2009:290). In the United Stated 19th century cultural-historical archaeology differed from that practiced in Europe at the time in that nationalist rivalries played no role in the concept of the archaeological culture in the United States.

Functionalist archaeology in the United States started in the 19th century with attempts to determine functions of specific artifacts through the use of direct historical approaches, such as ethnographic accounts and comparative studies (Trigger 2009:362). After World War II, processual approaches, namely ecological ones, started being practiced by American interdisciplinary teams. Steward pioneered the cultural ecology approach to human behavior in the United States, while Willey carried out the first regional settlement pattern study, setting the stage for New or Processual school of thought in archaeology (Trigger 2009:372).

In the 1960s and 1970s, the processual movement, influenced by British scholars, such as D. Clarke, and headed by Lewis Binford in the United States, began taking off in the West. This approach viewed culture as people's extrasomatic means of adaptation and saw cultural change as a product of rational human response to environmental factors. Processual approaches emphasized similarities and regularities across cultural systems, stressing scientific method, sampling, and ethnographic comparisons (Trigger 2009:405).

Starting in the late 1970s and early 1980s, largely influenced by the social anthropology and the broader postmodernist social movement, archaeologists in the United States began employing various postprocessual approaches in their works. Postprocessualist approaches emphasized the role played by human consciousness in shaping society and viewed people as active agents, rather than passive objects influenced by external factors (Trigger 2009:445). The concept of relativism, and the notion that knowledge and truth are subjective and multifaceted, lay at the foundation of postmodernist anthropology. Postmodernism places the emphasis on subjective interpretations and viewpoints, which come from individual members of society, including minorities, women, and other groups that have been disadvantaged

throughout human history. Postprocessualism is a blanket term that encompasses various theoretical approaches such as Neo-Marxism, Post-Positivism, Critical Theory, Structuralism, Phenomenology, and others (Johnson 1999). Currently, many American archaeologists, to one degree or another, operate under the guise of the postprocessual school of thought.

2.1.2 Russia

The mid and late 19th century was the time of rapid development of archaeology in Russia, with the Russian government establishing a commission assigned to safeguard archaeological remains and archaeology becoming a university discipline (Trigger 2009:231). In the late nineteenth century, Russian archaeology shifted from antiquarianism to being a scientific pursuit, with the nature of research comparable to that done elsewhere in Europe (Trigger 2009:230). The 'scientific approach' to archaeology in Russia in the 19th century entailed the systemization of typological archaeological 'culture' attributes under the culture-historical paradigm. During the nineteenth century, Russian archaeology seemed to have gone from antiquarianism directly to the culture-history phase, bypassing the evolutionary stage of archaeological theory prevalent in other European countries (Trigger 2009).

During the Soviet era, every aspect of human life and social interaction was immersed in Marxist ideology, more specifically, *Marxism/Leninism* - the official state ideology of the Soviet Union. Marxism heavily influenced university subjects such as political science, economics, and philosophy, as well as deeply impacted most humanity-related disciplines, including archaeology. According to the Marxist framework, all human cultures tend to follow a four-step unilinear evolutionary trajectory, based on different production modes: primitive (pre-class society), ancient (Asiatic/slave holding), feudal bourgeois (capitalist), and classless

(communism) (Marx and Engles 1967). One of the main questions that Soviet archaeologists and historians were concerned with, or at least what the prevalent ideology of the time dictated them to be concerned with, was: what Marxist evolutionary stage did a given society operate under?

In the words of Marx himself, "instruments of labor … are indicators of the social conditions under which labor is carried on" (Marx 1906:200). According to Marx (1906), forces and relations in production shape society's superstructure. Soviet archaeologists were forced to strictly adhere to the Marxist analysis of material remains in the way that the Communist Party leaders understood it. The positive outcomes of such an approach were the interest in the underlying social structures of a given society and the emphasis on production processes, including experimental archeology. Some argue that Soviet archaeologists were pioneers when, in the 1920s, they began placing the emphasis on the internal social and economic conditions, rather than external factors, such as ecology, to explain culture change (Trigger 2009:384). The downfall was that Marxist approach and synthesis of material remains was the only one allowed, with no room for diversity.

Soviet Marxist archaeology advocated a materialistic approach to prehistory, with the material base assumed to be the primary driving force behind the operations of a society (Kohl 2007a:XVI). A materialistic approach assumes that ideologies and other aspects of the superstructure prevalent in a given society can be reconstructed from the material base available to archaeologists. In other words, people's thoughts and ideas are traceable through various economic and technological activities (Hodder 1986:18). Even though a materialist approach to culture worked great within the Marxist framework during the Soviet era, it left

little room for idealist archaeological interpretations that did not necessarily see a direct, deterministic relationship between the material organization of resources, on one hand, and people's ideas and values, on the other, in a given society (Hodder 1986:21).

Another distinguishing feature of Soviet, and in some cases post-Soviet, archaeology was the notion and importance of "ethnos" or "ethnicity" in the context of archaeological cultures (Frachetti 2008:35). Soviet archaeologists attempted to trace the locational distributions and movements of various ethnic groups through prehistory based on artifact typologies. Conflicts between European nation-states throughout the first half of the 20th century heightened the need to build national pride by reconstructing the life ways of heroic ancestors. To counter Nazi claims of Aryan superiority, Russian archaeologists set out to prove that Slavs were not inferior to their Germanic neighbors, reinforcing the view that archaeological cultures equated to specific ethnicities (Trigger 2009:236).

After the fall of the Soviet Union, Russia experienced a period of economic decline and social instability. These social changes greatly influenced the discipline of archaeology. Government funding was cut drastically, students flocked into more "practical" fields, like business and economics, while arts and humanities enrollment rates declined. After the Soviet censorship system collapsed, there was no strict ideological control or guidance on how to analyze and interpret archaeological remains. Some archaeologists chose not to change their theoretical stance or incorporate new methodologies into their work, while others, the few that were bilingual and more open to change, started exposing themselves to overwhelming amounts of western archaeological literature that they did not have access to before. This

process resulted in Russian archaeologists selectively incorporating various aspects and fragments of western archaeological theory into their work.

Although present-day Russian archaeological literature features certain processual and postprocessual theoretical perspectives, it, for the most part, remains cultural-historical in nature. According to Kohl (2007:17), the tendency to identify archaeological cultures as ancestors of later historical ethnic groups remains very much alive in Russian archaeological research. In his foreword to "The Urals and Western Siberia in the Bronze and Iron Ages" written by Russian archaeologists L. Koryakova and A. Epimakhov in 2007, Philip Kohl points out that "western readers may be struck by occasional ethnic, linguistic, and even racial attributions of specific archaeological cultures" (Kohl 2007a:XVI). There are also cases in Russian archaeological literature of craniometrics, or the systematic measurement and comparison of certain cranial phenotypes, along with the comparison of other biological traits, being used to link or differentiate archaeological cultures from one another (Frachetti 2008:45). Terms such as "Caucazoid", "Europoid" or "Mongoloid" are being used to this day by some Russian archaeologists. With a significant number of Russian archaeologists receiving their professional training during the Soviet Union times, many features of the Soviet school of thought outlined above are still characteristic of the present-day archaeological research in Russia.

2.2 Comparison of the two schools of thought

While archaeology in North America has been a part of the anthropology discipline, in Russia, archaeology has been tightly linked to history, and general historical analysis was applied to archaeological remains, with no need seen for the development of unique

archaeological theoretical frameworks (Trigger 2009:342). The historical vs. anthropological orientation of archaeology is where one of the main distinctions in the two schools of thought lies, with the primary goal of Russian archaeology being the production of national history and prehistory. The anthropological approach practiced by American archaeologists, on the other hand, entails the adoption of anthropological theories into the study of material culture.

While archaeology in the United States was going through shifts from the culture-historical phase to functional, processual, and post-processual approaches, Soviet archaeological thought changed little and adhered to the strict Marxist interpretation of material remains, combined with the culture-historical approach. While it would seem that American archaeologists who utilize a postprocessual Marxist approach arrived at the theoretical framework practiced by Soviet archaeologists since the 1920s, the two "Marxisms" are qualitatively different. As already mentioned, Soviet Marxism was more "orthodox" and strictly adhered to Marx's writings (Trigger 2009:444), a small portion of which dealt with pre-class societies; while postprocessual Marxist anthropology uses Marx's writings as a launching platform for novel concepts and ideas. The historical trajectories of the two schools of thought illustrate how, over the years, archaeological thought has been a reflection of political and ideological atmospheres in each country.

2.3 Differences in motivations and methodological practices

Besides the vast differences between the two countries in the histories of archaeological theory outlined above, there are other methodological and political factors that make American archaeology different from its Russian counterpart. Prehistoric American archaeologists

working in the United States excavate the remains of Native Americans whose descendants occasionally sue the scientists and reclaim artifacts and human remains. European archaeologists, on the other hand, feel they excavate the remains of, if not their direct ancestors, then prehistoric human groups very closely connected to themselves. This notion of historical continuity between prehistoric cultures and present-day populations is occasionally used in politically-motivated contexts in both Europe and North America.

According to Trigger, the cultural-historical approach "can be used to bolster the pride and morale of nations or ethnic groups … who feel thwarted or threatened … by stressing specific periods in history and assigning particular ethnic identities to archaeological finds" (Trigger 2009:261). The Eurasian Steppes are located on the border of Europe and Asia, and historically have been the area where various "European" and "Asian" ethnic groups traded, intermixed, waged war on each other, and competed for territory. It is not a coincidence that the "European"-looking facial reconstructions of the Yamnaya, Sintashta, or the later Saka people appear in publications concerning the region and are being displayed in the museums, located on the present-day border of Russia and Central Asia. Evidently, it is important to some whether the Sintashta people were "Europoids", and therefore looked more like Russians, rather than their Kazakh, Bashkir, or Tatar neighbors. Now, after the collapse of the Soviet Union, when every one of the newly-emerged fifteen republics is trying to build a sense of national pride, justify its present-day borders, and prove that its contribution to the prehistory of the region is not inferior to that of its neighbors, archaeology has the potential to be used in political and territorial disputes. Even though archaeology is used politically in the United

States by Native American groups in recourse or territory claims, in Russia this process can potentially have international implications.

Other differences between Russian and American archaeology lie in methodological practices. Soviet archaeologists, working in the Eurasian Steppes, primarily have been interested in 'kurgans' (earthen burial mounds) thousands of which have been excavated since the 1970s during numerous CRM-type salvage projects (Kohl 2007:15). Since the collapse of the Soviet Union, Russian archaeology has been severely underfunded, thus influencing the methodological strategies employed by Russian scientists. With a lot of the excavation equipment dating back to the times of the Soviet Union and with, oftentimes costly, remote-sensing techniques being out of financial reach, it made practical sense for Russian archaeologists to excavate kurgans, which are fairly easy to locate in the steppe landscape. This "kurgan archaeology" (Kohl 2007:16) results in the archaeological data, available to researchers, being skewed toward one type of evidence (i.e., burial).

Also, the fact that many of the field reports from past excavations in the steppes are either in paper format (i.e., not digitized in any way) or unpublished makes them hard to access and analyze by Western or other Russian archaeologists. Another issue is that archaeologists created countless divisions and subdivisions of various archaeological cultures, with specific names and terminology sometimes not being uniform due to the lack of coordination and communication between archaeologists working in different regions of the former Soviet Union (Kohl 2007:16).

2.4 Conclusion

Russian archaeology still seems to be heavily influenced by the cultural-historical theoretical paradigm, and it is important to keep in mind that most of the academic material dealing with the Southern Urals during the Bronze Age is written from the perspective of this theoretical framework. Applying a wide array of Western theoretical approaches to the analysis of the MBA-LBA transition in the Southern Urals may help see the prehistory of the region in a different light. Methodologically, GIS-based settlement pattern research, outlined in the later chapters of this thesis, is different from the 'kurgan archaeology', largely relied upon by Russian archaeologists thus far. Although the Bronze Age settlement patterning of the Southern Urals region has been analyzed by Russian archaeologists to some degree, burial evidence seems to hold sway across regional scholarly publications. By incorporating various spatial analysis techniques as well as recent theoretical developments of the Anglo-American school of thought into the archaeological analysis of the Southern Urals, GIS-based settlement pattern research can add to and possibly alter our understanding of the Eurasian Steppe prehistory.

The original research, outlined in chapter six of this thesis heavily relies on the culture-historical typologies developed by Russian archaeologists in order to describe and understand the cultural developments taking place in the Southern Urals during the Bronze Age. The Kyzil Area case study incorporates processual theoretical approaches into the analysis by evaluating settlement locations in relation to environmental resources and reconstructing regional paleodemographic dynamics based on quantitative settlement data. The utilization of the Anglo-American postprocessual approaches is evident in the incorporation of the GIS

techniques that address phenomenological aspects of landscape perception, such as the Visibility and Cost Surface Analyses, which will be discussed in detail in the following chapter. The examination of the role played by metallurgical craft specialization in the MBA-LBA transition could be, at least in part, attributed to the Marxist approach, utilized by Soviet as well as Anglo-American post-processual archaeologists. Thereby, theoretical and methodological approaches characteristic of both Russian and Anglo-American archaeological thought are incorporated into the following analysis in an attempt to address specific research questions pertaining to the MBA-LBA transition in the Southern Urals region.

3 Settlement pattern studies and Geographic Information Systems (GIS)

Since the original research, outlined in chapter six of this thesis, essentially represents a GIS-based regional settlement pattern study, it is useful to discuss the roles of settlement pattern studies and Geographic Information Systems (GIS) in archaeology. The following chapter focuses on the history and the present state of theoretical perspectives behind the regional settlement pattern research, as well as the use of GIS as a scientific, archaeological tool. More specifically, the following chapter outlines how changing theoretical perspectives have influenced landscape archeology, evaluates the role of GIS in regional settlement pattern studies, and discusses how archaeologists are addressing the environmental determinism criticisms leveled at GIS archaeological applications.

3.1 Theoretical and methodological perspectives in settlement pattern research

Settlement pattern studies represent an increasingly important component of archaeological investigations, with the *American Antiquity* publications indicating a ten-fold increase over the past four decades in the percentage of lead articles dealing with settlement pattern themes (Alcock and Cherry 2004:2). The first settlement pattern survey in the Americas was carried out in 1946 by Gordon Willey and James Ford in the Viru Valley of Peru. The goal was to record all of the archaeological sites in the region, describe their geographical and geological position, outline their function and sequence of development, reconstruct cultural institutions prevalent at these sites, and compare the settlement history of the Viru Valley region to other regions of Peru (Willey 1953:1). Although changing theoretical perspectives

have definitely altered the nature of settlement pattern investigations, present-day regional settlement pattern studies still adhere to the general guidelines outlined by Willey in 1946.

Archaeologists saw little value in settlement pattern studies up until the 1960s. That was when the interest in using regional settlement surveys grew (Billman 1999:2), with regional surveys of the time addressing a variety of functional and processual issues. Archaeologists began to realize that this approach is essential when recreating prehistoric political institutions, social stratification systems, warfare dynamics, and subsistence strategies in a given region. Individual sites began being viewed as representative of a particular culture or region, rather than ends in themselves (Trigger 2009:377), which worked very well with a systems-based approach to examining past societies. Regional surveys gave archaeologists an opportunity to hypothesize about demographic, social, and political changes on both inter- and intra- regional scales.

When discussing 'regional' settlement pattern studies, it is important to examine the concepts of regions and regional archaeology as they are understood today by the archaeological community. The concepts of 'regional archaeology' and 'settlement pattern archaeology' are often conflated and used interchangeably. Kantner (2007:43) argues that settlement pattern studies are more narrowly focused on generating quantifiable data, while regional archeological pursuits are able to address a wider variety of anthropological problems. Defining what constitutes a region in particular, and spatial archaeological unit in general, is highly subjective and is "more an art than an empirical process" (Kantner 2007:44). Geographical features, modern-day political borders, the level of material culture continuity, along with a host of other factors, are utilized by researchers in determining the appropriate

scale of the archaeological 'region' being studied. Depending on the specific research questions addressed in the study and the theoretical perspectives employed by the researcher, the definition of what constitutes a 'region' may fluctuate greatly (Kantner 2007:41).

Regional settlement pattern studies now fall under the rubric of landscape archaeology, which aims to analyze the relations between human actions and the surrounding landscape by combining ecological and social approaches (Barker and Mattingly 1999:IX). A number of settlement pattern studies in the latter half of the 20th century sought to find causal linkages between environmental factors, such as agricultural land productivity or the presence of natural resources, to the distributions of settlements. As more such studies were carried out, archaeologists noticed the increasing implausibility of such an approach in a number of instances. While critiques of environmental determinism and economic rationality are leveled at the earlier settlement pattern studies, some argue they helped overcome the strict ecological adaptation framework and illustrated that other social and cultural factors played a significant role in shaping human settlement (Trigger 2009:376).

Postprocessual developments in archaeology, stressing qualitative and phenomenological perspectives, have had a great influence on landscape archaeology in general, and settlement pattern studies in particular. Archaeologists now recognize that landscapes are socially constructed, subjectively experienced and qualitative, as well as economic and quantitative in nature (Witcher 1999:13). Social, ritual and cognitive aspects of landscape are now being incorporated into archaeology (Witcher 1999:15), contributing to the 'humanization' of the landscape concept and altering settlement pattern research strategies. Such concepts as 'landscapes of power' (Cherry 1978:164-166), 'ritual landscapes' (Renfrew

1984), and 'mental maps' (Downs and Stea 1977) have been used in archaeological literature for some time now.

It is important to note the influence that the discipline of geography has had on the archaeological scientific pursuit. Phenomenological approaches to landscape analysis were first developed by human geographers, such as Ted Relph (1976) and Yi-Fu Tuan (1974); while New Archaeology was strongly influenced by New Geography, aimed to move beyond descriptive synthesis by developing various measurement and comparison techniques (Connoly and Blake 2006:208-209). Viewing regions as continuous processes rather than objective entities is also a concept that originated from the theoretical developments in the field of geography mentioned above (Connoly and Blake 2006:209).

Postprocessual notions of individual agency and relativistic landscape perception have also found their way into settlement pattern research. Can we treat all sites as having equal significance, or 'equal value' and simply count the points on the map to help decide what role certain areas played in the prehistory of a given region? Assuming the subjective nature of landscape perception by individuals, can we make generalizations about the significance and meaning of a particular site to the aggregate community? These are some of the questions that settlement pattern archaeologists currently attempt to address by altering the existing research strategies and incorporating new methodologies into their work (Witcher 1999:17).

Regional archaeological analysis is a diverse academic pursuit, informed by a variety of theoretical paradigms dealing with human-space interaction (Kantner 2007:62). Regional settlement pattern research, in particular, seems to be differentiated based on the type of source data used – ecological or social, with the resulting analysis privileging environmental or

cultural information, respectively (Wheatley and Gillings 2002:236). Although the current trend is toward the dissolution of barriers between the environmental and humanistic approaches, a certain level of divide still exists between the two theoretical frameworks, especially in settlement pattern studies.

Since regional surveys oftentimes serve as foundations for settlement pattern studies, certain methodological aspects of survey work are worth discussing in some detail. There are no widely agreed upon procedures for carrying out or analyzing survey datasets. According to Alcock and Cherry (2004:4), at the outset of the 21st century "we are faced with an influx of regionally based archaeological data of unprecedented diversity from hundreds of individual survey projects". Although characteristics of individual settlement pattern studies tend to vary, overall, two emerging trends are currently being emphasized to a greater extent.

One trend has to do with the increase in the scale of regional surveys, by either combining the results of individual studies or carrying out larger surveys to begin with. The scale of a regional settlement pattern survey can greatly alter the results of a study. Micro-level surveys might yield different social, economic, and political relations than the larger-scale regional data. Using micro-regional surveys as a form of a probability sampling methodology, advocated by the processual school of thought, is not always appropriate for identifying regional spatial patterning (Lock et al. 1999:55). Therefore, a regional perspective, as it pertains to archaeological analysis, aims to combine smaller-scale studies and interpret various archaeological material in a wider regional context. The focus on the increase in scale is perfectly illustrated in a number of archaeological studies carried out at a 'supra-regional' scale

that are oftentimes informed by the world-system theory and long-distance migration processes (Geib 2000; Smith and Montiel 2001).

When discussing the scale of regional surveys and settlement pattern studies, it is worthwhile to mention site catchment analysis – a technique that analyzes the locations of archaeological sites in relation to available economic resources. In such studies, the scale of the survey, corresponding to the site's exploitation territory or *catchment*, is determined empirically by analyzing the corresponding cost surface surrounding the site (Wheatley and Gillings 2002:159,160). Therefore, the scale of a survey in site catchment studies is pre-determined by the extent of the catchment zone.

The other trend in settlement pattern studies is the focus on the intensity of survey coverages, with labor-intensive pedestrian reconnaissance being the prevalent methodology in many parts of the world (Alcock and Cherry 2004:3). Due to a number of regional studies illustrating a great level of settlement pattern diversity and complexity even at the smallest scale, the oftentimes costly 'full-coverage' surveys are almost universally preferred to various sampling approaches, previously advocated by the processual school of thought (Kantner 2007:47).

Even though the trends noted above seem mostly methodological, they are theoretical in nature as well. Do we, as archaeologists place greater emphasis on reconstructing large-scale processes taking places over vaster territorial expanses, or do we want to spend more time and resources toward a detailed micro-level analysis of smaller settlement networks? In the perfect world, archaeologists would like to do both, but in reality each surveyor chooses which aspect, scale or intensity, to dedicate more of the available resources to. Surveys, like

excavation records, are never impartial, with different people producing different accounts of the same landscape (Alcock and Cherry 2004:47). Most archaeologists today seem to strive for the increase in scale, with the prevalent opinion being that it is much safer to decode and handle a few large-scale surveys than lots of small ones, which often do not have the sufficient 'critical mass' to allow us to understand broader regional processes (Alcock and Cherry 2004:47).

3.2 Role of GIS in regional settlement pattern research

Geographic Information Systems (GIS) is a combination of software technologies and digital tools used in collecting, storing, transforming, displaying, and analyzing various spatial data (Wheatley and Gillings 2002:9). With GIS first appearing in Canada in the 1960s as a natural recourse inventory system (Wheatley and Gillings 2002:14), it is now used in a wide variety of contexts ranging from forestry and flood control to city planning and transportation services. The debate still goes on whether GIS is a science in of itself, or a theoretically-neutral tool fit for use in a wide variety of applications, including social sciences (Lock 2000:29). Although in the geosciences field, the distinction is made between the Geographic Information Systems (GIS) - a combination of computer hardware and software, and the Geographic Information Science (GISci) - a multidisciplinary scientific field behind the GIS technology, for researchers utilizing GIS outside of the geosciences realm the definition of GIS still seems to entail a combination of the two concepts (Longley et al. 2005).

It has been recognized for some time that the disciplines of archaeology and geography overlap to some degree in their focus on the relationship between spatial structures and

human action, with the history of intellectual traffic between the two fields dating back as far as the 16th century (Connoly and Lake 2006:208). The notion of mapping prehistoric settlements in relation to environmental variables started in England in the beginning of the 20th century by anthro-geographers such as Crawford and Fox (Wheatley and Gillings 2002:5). While for the majority of the 20th century spatial archaeological data has been recorded by hand, beginning in the 1960s, with the processual quantitative shift in archaeology, various computer tools, dealing with graphical representations and statistical analyses, began being incorporated into archaeological research. The use of GIS, in particular, began in the early 1980s in the United States in the context of various New Archaeology approaches (Wheatley and Gillings 2002:18).

Over the last two decades the rise of GIS-based approaches in archaeological research has been tremendous (Lock 2000:1). Since archaeology deals with the interpretation of geographically located material, it seems natural for GIS - a leading technological tool dealing with any and everything spatial, to be one of the leading methods used in spatially-oriented archaeological research. Since its introduction into the discipline more than three decades ago, archaeologists have found GIS very useful when dealing with geographic locations or spatial relations of sites, features, structures, and individual artifacts.

It is useful to say a few words about the archaeological interpretation of space and how GIS ties into and facilitates archeological spatial analysis. Most of the data archaeologists recover is spatial in nature or has an important spatial component (Wheatley and Gillings 2002:3). Artifacts and sites all have an absolute geographic or relative locations, and it is these locational or spatial relationships that GIS helps archaeologists examine. Spatial relationships

of archaeological features with respect to each other or relative to other environmental, cosmological, or ritual variables may help archaeologists reconstruct important aspects of past human lifeways.

From the outset of its use in archaeology, GIS was used to create distribution maps that would analyze human activities as guided mainly by environmental factors, with space being viewed as neutral, quantifiable and static (Wheatley and Gillings 2002:7-8). With the arrival of postprocessualism, space began to be viewed as culturally constructed, subjective, and experienced, rather than external and uniform (Wheatley and Gillings 2002:8). Christopher Tilley (1994), for instance, with his phenomenological approach to landscape analysis, saw space as shaped and transformed through cultural activity, with the individual being the primary vehicle for experiencing and understanding space in the past. These theoretical developments called for the introduction of new GIS techniques into archaeological spatial analysis, which will be discussed in detail later in this section.

GIS research, as it pertains to archaeology, can be broadly divided into regional and intra-site studies, with the research arena being almost totally dominated by the regional landscape projects (Wheatley and Gillings 2002:235). Since the 1990s the use of GIS in regional landscape studies became "sedimented within archaeological practice" (Wheatley and Gillings 2002:1). According to Wheatley and Gillings (2002:235), "most would now be surprised to see a regional archaeological project that did not claim to utilize it [GIS]".

How exactly do archaeologists utilize GIS in the context of regional settlement pattern studies? Regions, whether natural, socio-political, or subjectively-constructed, can be generated in GIS as polygons or series of distinctly coded cells, and then further manipulated to

help archaeologists address various research questions (Connoly and Lake 2006). Settlements, natural features, ritual aspects, along with an infinite variability of other attributes, are then incorporated into regional maps to help archaeologists identify what factors influenced the patterning of settlements within a given region, thereby making GIS a leading analytical tool in this field of archaeology.

3.3 GIS and environmental determinism

Concepts of environmental determinism and cultural ecology, oftentimes associated with New Archaeology, are based on the idea that environmental factors shape culture and guide human behavior. The concept of cultural ecology, in particular, was introduced by Julian Steward, who saw ecological adaptation to environmental factors as the main driving force behind people's decision making in the past (Johnson 1999:144). While criticized for being formalist, driven by Western capitalist ideology, and inappropriate for explaining the economic choices of past societies (Johnson 1999:146), environmental determinism has been closely associated with GIS-based research. Since GIS was originally created to work with ecological and environmental data in the context of geography-based research, it was easy for the anthropologists who pioneered the use of this tool in the field of archaeology to carry the environmental focus into their studies. Prior to postprocessual developments in archaeology, GIS was mainly used to create distribution maps of archaeological sites with attempts to find causal linkages between site locations and environmental variables (Wheatley and Gillings 2002:5). Predictive modeling GIS applications, in particular, oftentimes relied upon in CRM projects, have been criticized for utilizing various characteristics of the natural environment in

attempts to model settlement choices in the past (Wheatley and Gillings 2002:165,179). While in order to address certain research questions it is essential to consider the locations of environmental resources, one has to be careful not to reduce people to simple rational optimizers, concerned only with economic wellbeing.

Since the early use of computer tools in archaeology was associated with the processual school of thought, some postprocessual archaeologists, who placed a heavy emphasis on humanistic theories, did not consider computer a well-suited tool for archaeological interpretations (Lock 2000:30). Postprocessual thought rejects the idea that natural science methodologies are appropriate for the study of social life, and to those viewing GIS as a science rather than a tool, it keeps being associated with objectivist natural science approaches. Some argue that to date, the use of GIS has largely represented positivist traditions and the quantitative treatment of archaeological data through GIS has been "to the detriment of advances made by post-processualist thinkers" (Lock 2000:XVI).

Another criticism leveled at GIS is that hegemonic powers imbedded in this technology result in spatial determinism, limiting archaeological data to points, lines, and polygons while excluding some important qualitative data (Lock 200:XVII). To the critics, GIS is associated with an absolute model of space, which creates representations of landscapes that are not compatible with the views and perceptions of people in the past. Some argue that the use of western analytical techniques and computer technologies creates a biased representation of space, imbedded in the views of present-day western society.

Contrary to the criticisms outlined above, since the 1980s, the use of GIS in archaeology has morphed into something new, and archaeologists still continue to develop "new insights

into the spatial structure of cultural remains" with the help of GIS (Wheatley and Gillings 2002:233). Some recent techniques addressing the subjective aspects of experiencing past landscapes are visibility and cost-surface analyses (Witcher 1999:15). These techniques can potentially give archaeologists insight into how individuals experienced their environment through the sense of vision or through movement across the landscape. These approaches advocate the notion of experiencing past terrain from within, making landscapes more relative and qualitative in nature (Witcher 1999:15). Therefore, we see how specific GIS techniques like visibility (view-shed) and cost-surface analyses feed into the postprocessual approach, which advocates the notion that human action can be best understood from the perspective of those performing the action.

Another approach in GIS, addressing the postprocessual agenda is the concept of 'sensuous geographies', which stresses the multisensual component of experiencing landscapes. Archaeologists are now trying to incorporate other senses, besides vision, like touch, smell, or hearing (Witcher 1999:16) into GIS analysis; and concepts such as 'auditory landscapes' are starting to be used in landscape archaeology studies. Variables such as security, status, power, and ritual are also being utilized by landscape archaeologists in creating 'mental maps' which would guide past human-environment interactions. "If we can map physical landscapes, why can we not give cartographic form to more abstract landscapes?" (Witcher 1999:18).

Overall, the current trend in GIS-based archaeological studies is toward the incorporation of a wide array of archaeological theory developments into the analysis, creating a more theoretically-informed GIS. Spatial components are being incorporated into social

theory studies at an increasing rate, with concepts such as the "political landscape" (Smith 2003:6) contributing toward the creation of a more spatially-engaged social theory. With respect to archaeological research, environmental and ecological variables are more easily measurable, compared to the more 'humanistic' aspects of landscape (Connoly and Lake 2006:180), which is part of the reason why a number of settlement pattern studies remain overly environmentally deterministic. Although the use of GIS still makes it easy to overemphasize the impact of environmental factors on cultural activity, by integrating the social and cultural variables into the analysis, archaeologists are moving toward the collapse of environmental vs. humanistic dichotomy (Wheatley and Gillings 2002:237). Archaeologists need to be aware that without a proper body of theory to guide it, GIS will continue to emphasize economic rationality and environmental determinism (Witcher 1999:15).

3.4 Conclusion

While from the start of settlement pattern studies through the 1980s, the environmental or ecological approaches dominated the field, humanistic approaches, emphasizing cultural and social factors of human existence, are now being incorporated into settlement pattern research at an increasing rate. GIS, a leading technological tool in spatial analysis, has played a tremendous role in regional settlement pattern research over the years. Recent GIS techniques aim to incorporate postprocessual trends in archaeological theory into regional landscape analysis, and diffuse the humanistic vs. ecological dichotomy in settlement pattern research. The Kyzil Area case study, outlined in chapter six of this thesis utilizes GIS in an effort to combine environmental, as well as humanistic approaches to human settlement

and, thereby, reflect a broad range of theoretical approaches associated with the field of landscape archaeology today.

4 Southern Urals during the Bronze Age

When describing the Eurasian Steppes during the Bronze Age (3300-800 BC) (Koryakova and Epimakhov 2007:19), one, almost inevitably, has to write or speak in terms of numerous "archaeological cultures". As already mentioned, Russian archaeology is cultural-historical in nature, and almost all of the archaeological material, accumulated and published about the Eurasian Steppe prehistory thus far, contains numerous names of distinct archaeological cultures. When one learns about Eurasian Steppe prehistory, one learns it in terms of these various cultures; it is the language by which Russian archaeologists communicate and transmit archaeological knowledge to each other as well as to their foreign colleagues. The following chapter examines the history and meaning of the "archaeological culture" concept in anthropological literature, followed by a brief description of the Bronze Age cultures of the Southern Ural steppes. The purpose of this chapter is to provide the reader with an overall picture of the Southern Urals during the Bronze Age.

4.1 Archaeological "culture": history and definition

The history of the term "archaeological culture" starts in the late nineteenth century, when the increasing competition for markets and resources due to spreading industrialization ultimately resulted in nationalistic moods sweeping through Europe. An increasing amount of attention started being paid to the concept of ethnicity as an important factor in shaping human history (Trigger 2009:211). European nation-states were viewed as "political expressions of ethnic identity" (Trigger 2009:212), where states were identified with, for the most part, one ethnic group and archaeologists were encouraged to study the origins of that

group. Nationalistic politics, aimed at strengthening the solidarity within a state, greatly influenced and encouraged the development of early cultural-historical archaeology.

Increasing industrialization also required more land to be cleared off for agriculture and other development projects, so massive amounts of archaeological materials surfaced, groups of which seemed to constantly reoccur together. Thus, an early definition of archaeological culture was born: "certain types of remains – pots, implements, ornaments, burial rites, house forms – constantly recurring together" (Childe 1929:V-VI). Some European archaeologists at the time attributed archaeological cultures to distinct ethnic groups and attempted to trace their migrations and interactions through space and time. For example, German archaeologist Kossina and his followers believed that similarities and differences in material culture correlated with similarities and differences in ethnicity (Trigger 2009:237). Also, in the early cultural-historical paradigm, a lot of attention was being paid to the concepts of migration and diffusion as the primary factors driving cultural change. According to this view, cultures, technologies, and ideas spread from core zones to new areas via migrations of distinct ethnic groups or diffusion processes (Trigger 2009:217).

While for some, archaeological cultures translated into ethnicities, others, like Childe expressed doubts in the archaeologists' ability to trace specific peoples in the archaeological record (Trigger 2009:246). Recent research has revealed that archaeological cultures are not a reliable source of information about specific ethnicities (Hudson 2006; Demoule 1999), since the latter are highly dynamic entities which can form or disassemble rapidly. Although considered by many not to make significant use of philosophical concepts and to serve the

needs of nation building, the cultural-historical approach remains a dominant school of archaeological thought in many countries (Trigger 2009: 261).

Since the area of interest (Southern Urals) is located in Russia, formerly a part of the Soviet Union, it is useful to discuss the Soviet archaeologists' attitude toward the concept of archaeological culture. In the Soviet literature, archaeological culture is defined as "an aggregate of archaeological features, similar to each other with a coherent repetition of styles and characteristics and differentiated from other archaeological features" (Sorokin and Gryaznov 1966:5). Archaeological cultures were seen as indicators of social, ethnic, and linguistic relationships between specific populations. Spatially outlined "culture zones" were associated with distinctive groups of people based on material culture typologies, with special attention paid to the regional migrations and population expansions across the zones and the resulting ethno-linguistic diffusion processes (Frachetti 2008:34).

Also, in the archaeological literature dealing with the prehistory of the Eurasian Steppes there is a lot of attention being paid to the concept of culture genesis, where archaeologists attempt to draw direct links between various archaeological cultures to determine how they are connected genetically. As will be discussed in more detail later, the MBA-LBA transition in the Southern Urals, in cultural-historical terms, has to do with the disappearance of the Sintashta culture and the appearance of the Srubnaya-Alakul cultural complex, with Petrovka cultural development likely representing the transitional stage between Sintashta and Alakul (subset of Andronovo). The continuity in material culture traditions, coupled with the stratigraphic evidence in burial and settlement contexts, confirms that the Alakul culture is a

direct successor of the Petrovka culture, a slightly younger relative of the Sintashta cultural tradition (Anthony 2007:448; Koryakova and Epimakhov 2007:138).

Although originally used for the purposes of classifying, characterizing, and comparing various sets of material remains, the cultural-historical approach has serious social and political implications when misused. For example, in the case of the Southern Urals, the tendency to draw genetic connections between archaeological cultures has led a number of archaeologists to associate the Sintashta people with the Aryans, a religious elite living in modern-day Iran and India during the second millennium BC. This link is based on the numerous similarities between the Rig Veda and Avesta religious texts and the Sintashta burial practices (Anthony 2007). Although not an ethnic connection per se, for those linking archaeological cultures to specific ethnicities, this theory may perpetuate the view of present-day ethnicities residing in Sintashta, Petrovka, and Andronovo territories as somehow genetically connected to the mythical Aryans. Certain individuals or groups, inclined to manipulate archaeological and historical knowledge to serve their purposes, may use such a "genetic" connection in nationalistic pursuits or racial superiority claims.

4.2 Bronze Age archaeological cultures of the Southern Urals

The Bronze Age was a very important period in Eurasian prehistory, during which major political, technological, cultural, and linguistic changes took place throughout the region. In the archaeological literature, the Eurasian Bronze Age is sub-divided into four periods: the Early Bronze Age (3300-2600 BC), the Middle Bronze Age (2500-1800 BC), the Late Bronze Age (1800-1500 BC), and the Final Bronze Age (1400-800 BC) (Koryakova and Epimakhov 2007:19). The

chronology outlined above is based on a series of radiocarbon dates collected from various sites across the Eurasian Steppes and the overall "similarity of the cultural processes" taking place across different landscape zones (Koryakova and Epimakhov 2007:18). The concept of 'metallurgical provinces', or technological networks based on groupings of technologically and morphologically similar objects, outlined by Chernykh (1978), has also played a great role in the division of the Bronze Age into the periods outlined above. Recently established radiocarbon dates may alter the Bronze Age chronology for a given region, such as the AMS dating project undertaken by Hanks, Epimakhov and Renfrew (2007), which has created a more coherent absolute chronology of the Southern Urals region. This project has established clear chronological relationships among various Bronze Age cultures and has pushed back the dates of many cultural sequence developments pertaining to the period (Hanks et al. 2007). Although there is some disagreement among archaeologists in regards to the exact dates of a given period, the dates outlined above provide the reader with a general picture of the Bronze Age chronology. The following section provides a brief overview of prehistoric developments that took place in the Southern Urals region during various stages the Bronze Age. Special attention is paid to the role played by metallurgy in the lives of the Bronze Age steppe populations.

4.2.1 Early Bronze Age

The Early and Middle Bronze Ages in the Urals and the surrounding steppes are characterized by the eastward spread of the Yamnaya and Abashevo cultural complexes. Yamnaya archaeological culture originated in the Eneolithic (Copper Age) and covered a vast territory stretching from the north shores of the Black Sea to the Trans-Urals, with the latter area being the eastern periphery of the Yamnaya cultural complex. The prevalent hypothesis

about the nature of subsistence of Yamnaya people is that they were nomadic pastoralists with a sheep-herding focus (Koryakova and Epimakhov 2007:54), who utilized wagons for transportation and constructed "kurgans" (burial mounds) to commemorate their dead. No long-term settlements associated with this culture are known in the Southern Urals, pointing to the likelihood of Yamnaya stock-breeders leading a mobile lifestyle (Koryakova and Epimakhov 2007:54). Metal objects, mostly tools, made out of pure copper are found in Yamnaya burials and are hypothesized to indicate the inheritent nature of the metallurgic craft specialization becoming socially significant during the Early Bronze Age (Koryakova and Epimakhov 2007:49). Yamnaya metalsmiths were among the first ones to explore and utilize local copper ore resources in the Southern Urals, specifically, the Kargaly mine (Anthony 2007:336). Yamnaya cultural horizon is also hypothesized to have played a pivotal role in the spread of wagon technology and Proto-Indo-European languages across the steppes during the 4th millennium BC (Anthony 2007:277).

4.2.2 Middle Bronze Age

The Abashevo culture, which originated at the very beginning of the second millennium BC, occupied the forest-steppe landscapes from the Don River basin in the east to the Trans-Urals in the west (see *Figure 4.1*). Some archaeologists identify Abashevo as the predecessor of the later Sintashta culture based on its priority in metalworking and continuity in pottery styles (Koryakova and Epimakhov 2007:57). Abashevo archaeological sites, besides burial grounds, include settlements and in some cases simple fortifications, which are not seen in the earlier Yamnaya culture. Livestock breeding, with a heavy focus on cattle (68-78% of faunal remains) is hypothesized to be the main form of subsistence of the Abashevo culture (Koryakova and

Epimakhov 2007:64). Within the Abashevo archaeological complex, archaeologists recognized the emergence of animal sacrifice in burial contexts, as well as the evidence of inter-tribal warfare, with a prime example being the Pepkino kurgan containing the remains of 28 massacred young males (Koryakova and Epimakhov 2007:63). Abashevo settlements contain materials associated with copper and bronze production such as metalworking tools, waste items, and ores.

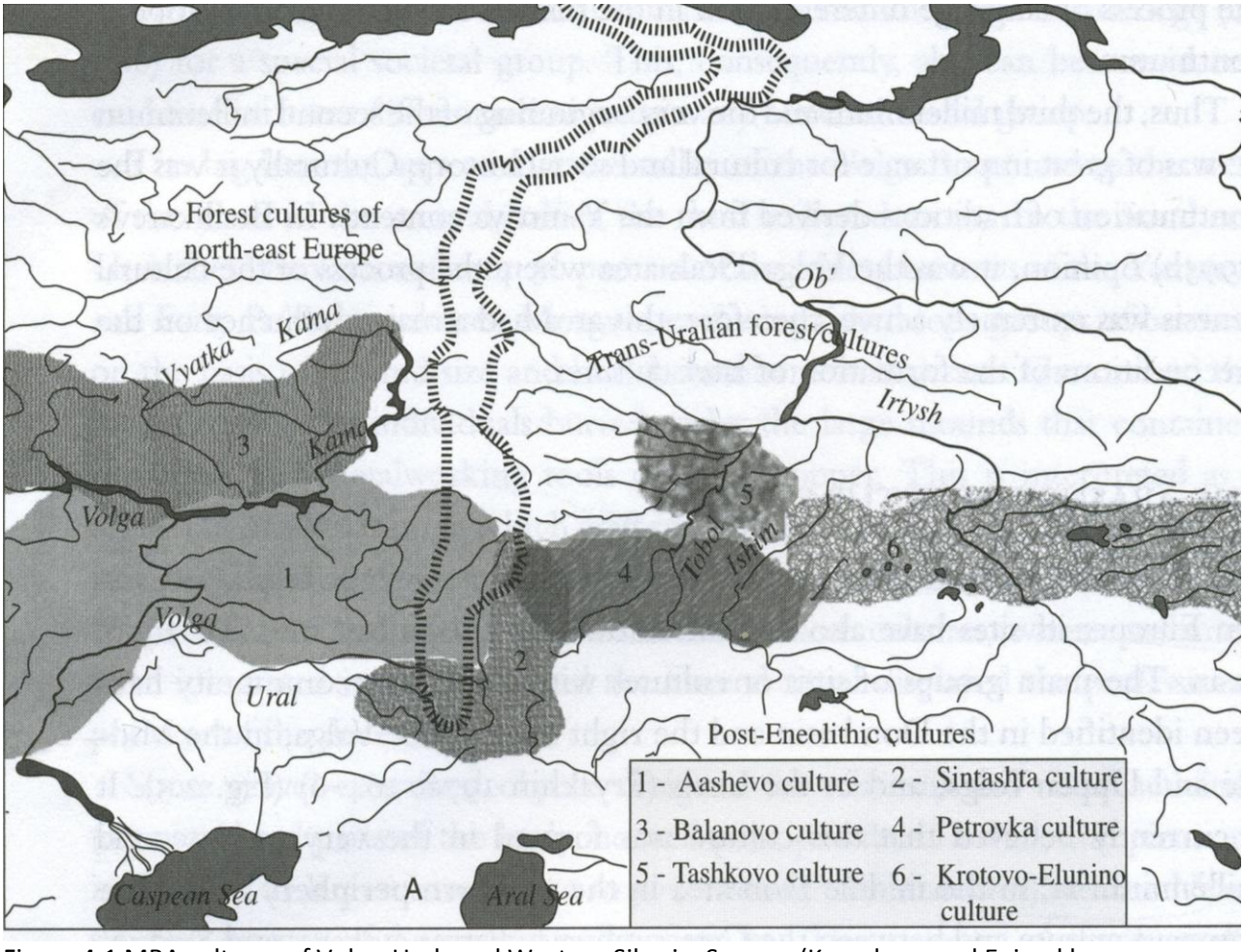

Figure 4.1 MBA cultures of Volgo-Urals and Western Siberia. Source: (Koryakova and Epimakhov 2007:58).

During the final period of Middle Bronze Age we see the appearance of "one of the most vibrantly debated prehistoric developments in the Eurasian steppes" (Hanks 2009:146) - the

Sintashta archaeological culture dating between 2100 BC and 1800 BC. Settlement evidence points to the existence of a system of closed fortifications, oftentimes referred to as "The Country of Towns", containing from one to four building horizons and enclosing areas from 6,000 to 35,000 square meters (Koryakova and Epimakhov 2007:68). One intriguing piece of evidence is that many houses within the fortified settlements contained traces of metal production (Koryakova and Epimakhov 2007:72). Another distinguishing feature of the Sintashta culture is the appearance of light chariots, which radiocarbon date as far back as 2000 BC, making them the oldest chariots in the world (Anthony 2007). Burial goods, such as weapons, associated with almost every male burial, and, in some cases entire chariots, indicate the military focus of the Sintashta society. Lavish burial sacrifices of livestock animals also set Sintashta apart from other Bronze Age cultures in the steppes. Pastoral livestock breeding was the basis of the Sintashta subsistence, supplemented by hunting and gathering (Koryakova and Epimakhov 2007:86). All sites without exception yield a great variety of sheep, horse, and cattle bones, indicating a mixed type of pastoralism. Although there is indirect evidence of agriculture, like sickles (or sickle-shaped knives) and grinding stones in the settlement context, "strong evidence for agricultural production at any time during the Bronze Age is nearly nonexistent in the steppes" (Frachetti 2008:50). It is known that throughout the Bronze Age, the dwellers of the Volga-Ural steppes actively incorporated wild seeds of *Chenoposium* (goosefoot), *Amaranthus*, *Brassica, Eragrosis, Palygonum, and Galium* into their diet (Anthony 2007:326; Popova 2006:299). Therefore, it seems that intensive seasonal gathering, rather than cultivated grain agriculture, was practiced by the populations of the steppes to a varying degree throughout the Bronze Age.

The interpretations of Sintashta sites are numerous, including: military fort, proto-city, ceremonial/religious center, administrative center, and temple (Koryakova and Epimakhov 2007:90). Architecturally similar circular fortified settlements dating to roughly the same time period are known to exist in other parts of the world, such as the Early Bronze Age Demircihuyuk settlement in Turkey (Korfmann 1983). Some scholars stress the mythological component of Sintashta settlements' architecture, comparing them to the temple-fortresses of Choresmia and Afghanistan (Pyankov 2002). Whether the MBA settlements in the Southern Urals were occupied seasonally or year-round is also unclear, which makes reconstructing the functional aspects of the sites along with the nature of Sintashta's subsistence economy more difficult.

At this point of the culture-historical analysis of the MBA-LBA transition on the Southern Urals, it is essential to discuss the Petrovka cultural development that, as mentioned earlier, likely represented an intermediate stage between the MBA Sintashta and LBA Alakul cultures. The architecture of Petrovka fortified settlements, which chiefly occupied the Tobol-Ishim watershed - a region lying to the east of the Southern Urals, is comparable to those of Sintashta, although characterized by a decrease in structural complexity (Koryakova and Epimakhov 2007:95,126). Although Petrovka culture, which slightly postdated the Sintashta development, was very similar to its predecessor, a few material culture correlates set the two cultures apart. Linear settlement layout plans of Petrovka fortifications exhibit a decline in architectural sophistication when compared to Sintashta sites (Koryakova and Epimakhov 2007:82). Pottery-making techniques and burial mound construction practices also differ among the two cultures. Another important distinction has to do with metal processing

practices, with Petrovka metalsmiths beginning to produce tin-bronze items, characteristic of the later Andronovo culture horizon and pointing to the utilization of Central Kazakhstan ore sources (Koryakova and Epimakhov 2007:83). Although Koryakova and Epimakhov (2007:126) include Petrovka into the Andronovo cultural 'family', the specific nature of the Sintashta-Petrovka-Alakul (Andronovo subset) cultural continuity will be discussed in the following chapter.

4.2.3 Late Bronze Age

During the Late Bronze Age, the Southern Urals were situates on the border of two of the biggest Bronze Age cultures (in terms of territory) in the Eurasian Steppes: the Srubnaya, and the Andronovo cultural groups (*Figure 4.2*). The Urals were at the eastern periphery of the Srubnaya archaeological culture, with its western limits spreading as far as modern-day Ukraine (Koryakova and Epimakhov 2007:112). Srubnaya settlements were unfortified, more dispersed and smaller in terms of the area covered and the number of housing depressions, when compared to the earlier Sintashta culture. Although Srubnaya settlements, overall, displayed a high level of variability in size, a lot of them contained only a few houses, and looked "modest", "monotone", "poor" (Koryakova and Epimakhov 2007:120) and highly standardized in terms of material culture. Srubnaya subsistence was based on localized livestock breeding in combination with gathering (Anthony 2007:439). There is evidence of metal processing activities throughout the Srubnaya settlements with mining assumed to be concentrated in mining camps, rather than dispersed through individual settlements.

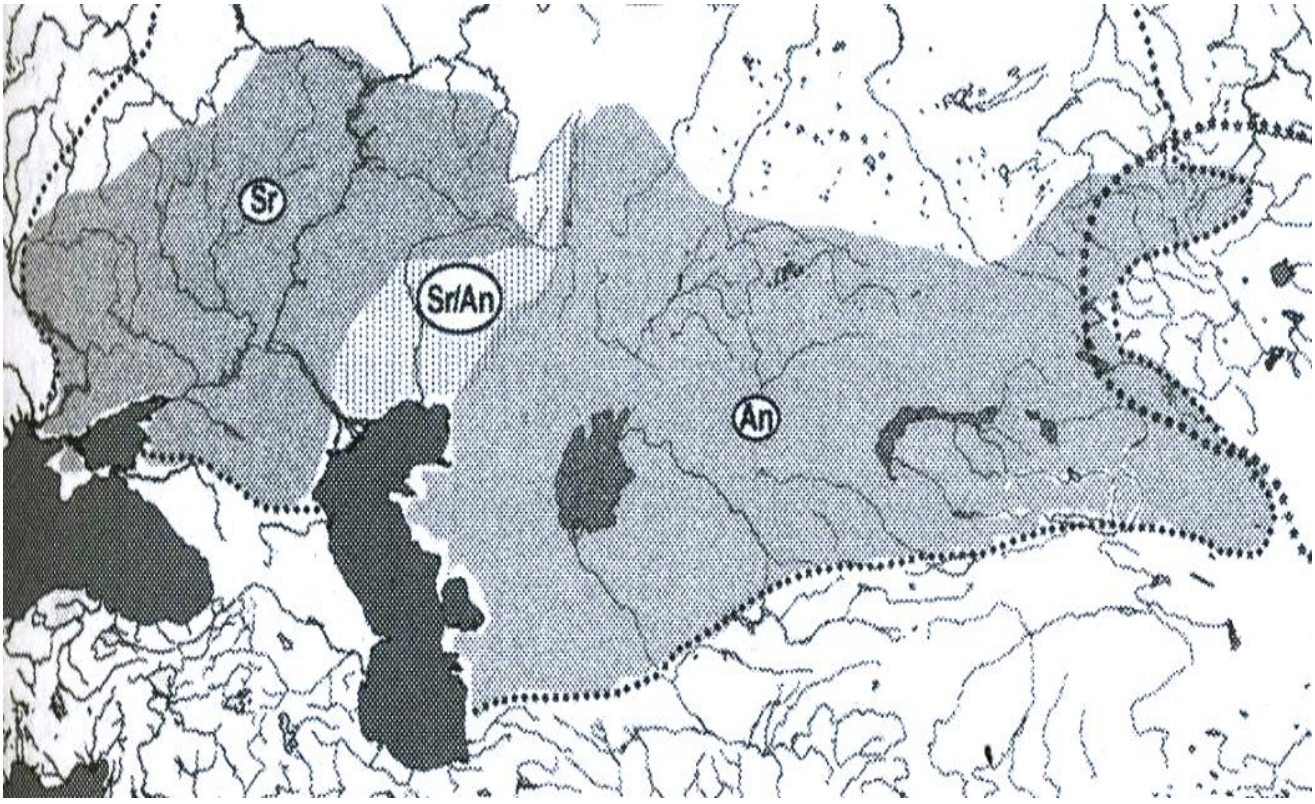

Figure 4.2 Late Bronze Age archaeological cultures of the steppes. An-Andronovo culture; Sr-Srubnaya culture; Sr/An - Srunaya-Andronovo cultural complex. Source: (Chernykh 2009:137).

The Andronovo "family" of archaeological cultures dominated the eastern Eurasian Steppes during the Late Bronze Age, stretching from the Volga-Ural watershed in the west to the Minusinsk Basin in the east. Alakul is the name of the western variant of the Andronovo culture, while Fedorovo culture comprises the eastern variant (Koryakova and Epimakhov 2007:124). Since the area under study represents the western periphery of the Andronovo cultural complex I will describe the Alakul variant in more detail.

Before proceeding to the discussion of the Alakul culture, however it is important to examine the term "family" as it pertains to a conglomerate of archaeological cultures, such as Andronovo. Besides indicating the presence a more or less unified material culture continuum, the term "family" may also be associated with the notion of a shared ethnic origin among the populations associated with such an archaeological culture complex. Overall, the spread of the

Andronovo cultural horizon or 'family' was associated with the appearance of permanent settlements relying on mixed livestock herding subsistence economy in the eastern part of the Eurasian Steppes (Anthony 2007:449).

Archaeological remains of the Alakul culture include cemeteries and settlements, which are usually located in the low river valleys, do not exceed 10,000 square meters in area, and are assumed to have been populated by no more than several hundred people (Koryakova and Epimakhov 2007:128). Alakul settlements consist of rows of uniform rectangular post-frame houses, containing wells, storage pits and fireplaces, some of which are characterized as metallurgical furnaces. Weaponry finds are rare, burial goods in the kurgan context are few, oftentimes limited to pottery (Koryakova and Epimakhov 2007:130). Although animal sacrifices still took place in the large kurgan burials, whole animals were replaced with disarticulated animal bones. Decreases in horse sacrifices and horse bridle objects in burial contexts indicate a decline in the chariotry practice during the Late Bronze Age in the Ural Steppes. The subsistence strategy of the Alakul population does not change drastically from the preceding periods, with a focus on cattle-dominated livestock breeding. Late Bronze Age archaeological remains from the steppes still show no direct evidence of plant cultivation, although sickles and grinding stones found in Alakul settlements suggest some level of grain processing, possibly resulting from seasonal intensive gathering. Weaving, leather processing, wood processing, and metallurgy were among the productive economies of the Alakul culture (Koryakova and Epimakhov 2007:147). Since the material correlates of both Srubnaya and Alakul archaeological cultures are observed in the area under study, the term "Srubnaya-Alakul cultural complex" is

used in archaeological literature when describing the Southern Urals during the Late Bronze Age period.

Overall, the Late Bronze Age in the Eurasian Steppes appears to be a period of "stabilization and colonization" (Koryakova and Epimakhov 2007:150). The absence of fortresses or defensible settlements, the decline in chariotry and weapon production, and the reduced significance of elaborate grave goods wealth displays, could all point to a more stable socio-political environment in the region. During the Late Bronze Age archaeologists also start seeing a high level of uniformity in funeral and religious practices over vast territories. Some argue for the presence of more egalitarian and less stratified social structures in the Late Bronze Age steppes, compared to the Middle Bronze Age (Kohl 2007:178). In Russian archaeological literature, the MBA-LBA transition in the Southern Urals is commonly referred to as the "de-evolution" of the Sintashta cultural phenomenon, based on the unilinear evolutionary notion of human society development (Epimakhov 2002:69). The MBA-LBA transition from 'simple' or middle-range society to a yet less-complex one is deemed "paradoxical" by some (Epimakhov 2002:62).

4.3 Subsistence base and metal production in the Southern Urals

As outlined in the previous section, the main source of subsistence for all Bronze Age cultures in the steppes was livestock breeding in combination with hunting and possible agriculture or intensive wild grain gathering. A few questions arise when evaluating the subsistence practices of the Bronze Age communities. The first question concerns whether the permanent nature of settlements during the Middle and Late Bronze Ages in the steppes is

compatible with a subsistence strategy that relies almost exclusively on pastoralism. A number of exclusively pastoralist cultures are known to migrate, at least semi-annually (Frachetti 2008), and the issue of possible pasture overgrazing has been brought up in the context of Bronze Age 'sedentary' cultures of the steppes (Kuzmina 2000). The second question has to do with how large-scale metal-processing activities observed in the region played into the subsistence economy of the communities living in the Urals and the surrounding steppes.

Recent excavations in the steppes suggest the feasibility of non-agricultural pastoralist communities living in year-round permanent settlements. The excavations of the Krasnosamarskoe settlement in the Samara river valley illustrated that permanent settlement strategy on the border of the steppe and forest-steppe environments was not incompatible with a mixed pastoralist-focused subsistence base, coupled with the utilization of wild resources (Popova 2006). The Sintashta area is on the steppe – forest-steppe border as well, and was even more so during the Middle Bronze Age when the region was more heavily forested (Zdanovich and Batanina 2007), which leads to the possibility of Sintashta people having a self-sufficient livestock subsistence base.

Multiple hypotheses have been put forward about the nature of Sintashta settlements, and in particular, the ways metallurgy played into Sintashta's subsistence economy. First of all, what was the level of the Sintashta communities' direct involvement in various stages of the metallurgical production process? The lack of mining or quarrying sites near the settlements and the location of arsenical copper mines on the peripheries of the "country of towns" (Hanks 2009:153) raise questions about the extent of involvement of Sintashta people in the mining process. The quarrying sites located within the "country of towns" territory (like Vorovskaya

Yama) do not yield any Sintashta ceramics, but do contain Srubnaya-Alakul sherds, pointing to the possibility of the existence of temporary work camps there during the Late Bronze Age (Hanks 2009:153). Furthermore, recent excavations have pointed to the possibility of Sintashta metallurgical tradition being a segmented process, with only final steps of metal production taking place at the sites (Hanks and Doonan 2009:349). The findings mentioned above raise the question of whether Sintashta populations were directly involved in mining the ores or did they trade for unprocessed or partially processed metal (ingots)?

There is evidence of arsenical bronze from the Southern Urals being used in the Middle Volga region (Peterson 2009:190), located to the west of the Urals, right at the time of Sintashta's existence. If there was metallurgical inter-regional exchange, it was probably limited to the copper ores or unprocessed bronze, rather than finished products, since the Middle Volga cultures, like Potapovka, created their own bronze finished pieces and maintained their own local metal pools by recycling bronze and copper (Peterson 2009:191).

There is also indirect evidence pointing to the possible exchange of copper/ bronze material between the Southern Urals and Central Asian cultures during the Bronze Age. Bactria Margiana Archaeological Complex (BMAC) is characterized as sedentary cultures that existed just south of the Aral Sea during the Bronze Age. Anthony (2007:421) suggests trade between the BMAC and Sintashta cultures, with the latter exporting bronze either as a raw material or in a processed form. Anthony (Anthony 2007:420) argues that the sharp increase in demand, which stimulated large-scale copper/bronze production in the steppes during the Middle Bronze Age, came from outside the Urals, with Central Asia being a likely source. One piece of evidence Anthony (2007) uses in his argument has to do with the fact that during the period of

intensification of bronze production in the Urals (2100-2000 BC), we witness the appearance of horses in the BMAC area, which are not native to the region, but are native to the Eurasian Steppes. The fact that simultaneously with the appearance of horses in the region, BMAC starts to export bronze objects in massive quantities south, into the Iranian Plateau, suggests possible metal and horse trade between the Sintashta communities and their southern neighbors (Anthony 2007:421). Archaeological evidence pointing to a reciprocal trade between the two regions, is quite limited in the Southern Urals. Pottery design motifs in the shape of a stepped pyramid, a wire made of pure lead, a lapis lazili bead from Afghanistan, and a Bactrian-handled bronze mirror all found at Sintashta sites are cited by Anthony (2007:433,434) as evidence of BMAC-Southern Urals reciprocal trade.

While archaeologists are not sure about how metal extraction and production tied into the economy of the Sintashta culture, there is evidence from Late Bronze Age settlements pointing to the presence of metallurgical labor specialization. The Srubnaya settlement of Gorny (dating to 2000-1700 BC), located within the Kargaly mining complex exhibits evidence of massive amounts of livestock (predominantly cattle) being traded in exchange for copper ores (Chernykh 2002:88; see Kohl 2007:174 for overview in English). The Kargaly mine, located in the Southern Urals, has been utilized since the Early Bronze Age (starting in the early third millennium BC) and well into historical times. Although it is estimated that millions of tons of copper ore have been extracted from the mine, which share of the mineral extraction was done during the Bronze Age is unclear. It is hypothesized that Gorny miners lived at the site year-round, consumed meat and milk products, and traded copper ores for livestock (Chernykh 1997b:69-71; see Kohl 2007:176 for overview in English).

The presence of other Srubnaya permanent settlements, besides Gorny, in the Kargaly area, coupled with the fact that Srubnaya pottery sherds were found in the shafts of the mine, point to the large-scale exploitation of the Kargaly mining complex during the Late Bronze Age (Chernykh 1997b; see Frachetti 2008:49 for overview in English). There are other quarrying sites pointing to the existence of mining camps in the southern Urals during the Late Bronze Age. One of them is the Vorovskaya Yama mine located within the "country of towns" territory, the excavations of which yielded numerous Srubnaya-Alakul-type ceramics (Hanks 2009:153).

Late Bronze Age settlements across the steppes exhibit the "persuasive evidence for local metal working" (Kohl 2007:177), where nearly every household seems capable of working metal to some degree. It is possible that the ore obtained at mining camps was disbursed, either in a raw or partially-processed form, to individual households in the Urals for further processing or south into Central Asia as a trade item. The vast territories covered by the Late Bronze Age cultural complexes, the high level of uniformity in material culture, and the centralization of copper ore extraction activities have led some to hypothesize about the presence of a despotic totalitarian state (Kohl 2007:177), which would coordinate economic activities over large territories and organize gulag-like labor camps, such as Gorny. No archaeological evidence supporting Kohl's hypothesis outlined above exists in the Southern Urals.

4.4 Conclusion

Overall, during the Bronze Age there are a few trends taking place in the Eurasian Steppes in general, and the southern Urals in particular. One is the transition from a mobile

lifestyle to living in permanent settlements. The other is the development of metallurgy, with it being limited to specialized craftspeople during the Early Bronze Age (i.e., Yamnaya and Abashevo cultures), to metallurgy being practiced by specific communities (Sintashta), to virtually everyone knowing how to process metal to some degree (Late Bronze Age cultures). Another transformation taking place in the steppes during the Bronze Age is the increasing level in the uniformity of material culture over vast territories. While during the Middle Bronze we find a larger number of distinct archaeological cultures occupying smaller territories, by the Late Bronze Age there are only two cultural complexes in the steppes (Andronovo and Srubnaya), occupying vast expanses of land. There are many ways to interpret and analyze these transitions and that is what Russian and Western archaeologists will continue doing for some time to come. The following chapter of the thesis along with the subsequent case study focus on the MBA-LBA transitional period in the Southern Urals.

5 MBA - LBA transition in the Southern Urals

As stated previously, this paper attempts to explore the nature and the possible underlying causes of the MBA-LBA transition in the Southern Urals, characterized by the replacement of the Sintashta culture by the Srubnaya-Alalkul cultural complex. Sintashta was a chiefdom-like society of metalsmiths and warriors, who controlled local metallurgical resources and exercised their influence on the neighboring tribes. Srubnaya-Alakul was a less warfare-oriented society composed of pastoralists and craftspeople. Territorially, the Sintashta archaeological complex was very compact, while the Srubnaya and Andronovo cultures (Alakul being a subset of the latter) occupied virtually the entire Eurasian Steppes. Sintashta culture existed for nearly 300 years while the Srubnaya and Anrdonovo cultural traits extended into the Final Bronze Age, which brings the total period of their existence to almost one thousand years. Sintashta settlements housed a couple thousand people while the Srubnaya-Alakul settlements were oftentimes comprised of only a few households.

What was behind this archaeological culture shift from Sintashta to Srubnaya-Anrdonovo in the Southern Urals? Why did people alter the rituals they practiced, settlement structures they lived in, ceramics they used, along with the tools and weapons they utilized on the daily basis? Were these even the same people? The following chapter summarizes what has been said about the MBA-LBA transition in various archaeological literature sources in an attempt to develop some hypotheses which can later be tested in the case study, presented in chapter six of this thesis.

5.1 Prevalent hypotheses in the archaeological literature

5.1.1 Archaeological culture genesis and the Sintashta-Alakul transition

Soviet archaeologists have done extensive work over the years in an attempt to establish the level of connection between various archaeological cultures of the Eurasian Steppes. Throughout history and prehistory, this region has been characterized by relatively drastic shifts in material culture traditions. Russian scholars, by relying on massive amounts of archaeological remains accumulated over many years of excavations and comparing pottery styles, burial practices, along with many other aspects of past human existence, have come up with a sort of a 'family tree' of archaeological cultures. This 'family tree' indicates which cultures are genetically connected, by establishing the descendant-ancestor, as well as other kinship-type links. The issues of migration vs. autonomous development are important in this type of archaeological culture analysis in determining the level of influence of certain cultures over others. Let us examine what relationships Russian scholars were able to establish between the MBA and LBA archaeological cultures of the Southern Urals.

Stratigraphic observations from settlements as well as kurgan burials have led to a nearly unanimous opinion among Russian (Tkachev 2007; Koryakova and Epimakhov 2007) and Western (Anthony 2007) scholars about Sintashta-Petrovka-Alakul cultural continuity. Petrovka, being a younger relative of the Sintashta culture, is also manifested in a series of fortified settlements, which are slightly less elaborate than those of the Sintashta culture and are oftentimes built right on top of the earlier Sintashta settlements (Tkachev 2007:25). Although no Petrovka sites are known in the Kyzil Area and therefore the settlement patterns of this culture will not be examined in the case study, it is important to know that Petrovka-type

settlements existed in other parts of the Southern Urals. Alakul archaeological culture settlements were not fortified, like the Petrovka or Sintashta ones, but other aspects of material culture and burial practices point to this culture's close relation to its two earlier analogues mentioned above. Due to the close correspondence in Petrovka and Alakul material culture complexes, a number of Russian archaeologists have even proposed to classify the Petrovka culture as "Early-Alakul" (Kuzmina and Sharafutdinova 1995:216;Tkachev 2007). Another important line of evidence used by Russian scholars in establishing genetic links between archaeological cultures is the practice of additional burials of the later archaeological cultures in the kurgans of the earlier ones, with the common logic being that human groups would not bury their dead in the burial mounds of people whom they did not consider their ancestors (Tkachev 2007:26). To summarize, in the Sintashta-Petrovka-Alakul cultural transition, along with similarities in material culture, we see all three cultures oftentimes occupying the same burial sites and building their settlements on top of those built by their earlier predecessors.

The situation described above is not as straight-forward as it seems. Russian scholars debate over which and how many cultures exactly participated in the formation of a given cultural complex. The variations are numerous. For example, Potemkina (1985) states that Petrovka was born out of interaction between the Sintashta, Abashevo, Poltavka (late Yamnaya variant) cultures with the local populations of the southern Trans(east of and beyond) -Urals and northern Kazakhstan. Grigoryev (2000) suggests that Alakul formed as a result of the interaction between Abashevo and Sintashta in the Cis(Western)-Urals and then migrated eastward.

A discussion of the genetic ancestry of Sintashta itself is beyond the scope of this paper, since the possible combinations of this archaeological culture's 'parents' mentioned in Russian archaeological literature are quite numerous. Various combinations of virtually all archaeological cultures of the preceding periods from all regions bordering on the Southern Urals have been speculated to participate in the formation of this cultural complex (Epimakhov 2002:71; Kuznetsov 1996:40-43). Among many other possible genetic links, the Sintashta culture is assumed to be connected to the Abashevo culture, with the former being a descendant of the latter. The level of the directness of this descent is unclear. According to Tkachev (2007:100), "in most of the Sitashta sites we observe Abashevo components of the material complex in a modified state, which leads to the conclusion of the passing down of cultural traditions". Epimakhov (2002:71), on the other hand, when summarizing the works of Russian scholars pertaining to the genesis of the Sintashta culture, states that the consensus among archaeologists is reached only in regard to the non-local nature of Sintashta's cultural roots.

Taking a step back from the Bronze-Age family tree of archaeological cultures, oftentimes arbitrarily created by modern archaeologists, let us get back to the issue at hand – the transition from the MBA to the LBA in the Southern Ural steppes as it pertains to various aspects of human existence. What factors could have caused the major changes associated with this transition period? In order to answer this question, it is useful to review the archaeological publications pertaining the MBA-LBA transition in the Southern Urals.

5.1.2 Role of migration-diffusion processes in the MBA LBA transition

When a relatively drastic shift in the material culture takes place in an area, two lines of analysis are utilized by archaeologists: autonomous development or outside influence, oftentimes associated with migration processes. In other words, in culture-historical terms, one archaeological culture can replace another due to a foreign non-local group of people physically migrating into the area; outside group(s) influencing local population indirectly through trade and other activities; the local population altering their material culture tradition autonomously through internal development; or the combination of these factors.

One of the reasons why the Sintashta culture draws so much international attention is its possible connections to the Aryans, a religious elite that resided in the territories of modern-day Iran and India starting in the second millennium BC. As previously mentioned, this link is based on numerous similarities between the rituals described in the Rig Veda and Avesta religious texts and the Sintashta burial practices (Anthony 2007:409). Without delving into this topic too deep, for the purposes of this paper this link is important because it proposes a possible route of migration of the Sintashta people through Central Asia into Iran and India. Considering that Rig Veda was compiled into books around 1500 BC, the underlying materials for which had been created some time earlier (Anthony 2007:408), was it possible that the Sintashta culture disappeared due to the massive migrations of its people to the south into Central Asia and further into Iran and India?

The spread of chariots into south-eastern Europe and China has been hypothesized, at least in part, to be resulting from population movements of the bearers of the Sintashta culture (Anthony 2007:411). According to Epimakhov (2002:77), during the Late Bronze Age (LBA) we

see a process of large-scale expansion eastward and westward of the Sintashta cultural "nucleus" or core, which results in the formation of "new cultural stereotypes" such as Petrovka to the east (northern Kazakhstan) and Potapovka to the west (Middle Volga). After the appearance of the Sintashta culture in the steppes of the Southern Urals, other communities surrounding the 'country of towns' gradually begin to adopt various cultural attributes of Sintahsta. In the forests to the north, for instance, the hunter-gatherer cultures located along the eastern slopes of the Urals start practicing metallurgy and producing pottery decorated with designs similar to those of Abashevo and Sintashta after 2100 BC (Anthony 2007:389). Could these cultural transformations be due to migration processes? According to Epimakhov (2002:77), LBA migration processes represented movements of distinct smaller groups, compared to the massive migration waves of the MBA, which played a great role in the formation of Sintashta culture.

As mentioned in the preceding chapter of this paper, there are numerous pieces of evidence pointing to the possible trade connections between the Urals and the BMAC culture located in Central Asia. The appearance of horses in the Iranian plateau of Mesopotamia shortly after 2000 BC could also be attributed, at least partially, to the population movements of the Sintashta people. Abashevo-like decoration designs and Sintashta-type pottery-making technology are observed on shreds found at the Central Asian BMAC sites starting around 2100 BC (Anthony 2007:428). Pottery from the steppes becomes more widespread at BMAC sites by around 1800 BC. Finally, Tugai, which Anthony claims to be a Petrovka settlement, containing two copper-smelting ovens and "at least one dwelling" appears in Central Asia by 1800 BC

(Anthony 2007:429). Horse cheek-pieces and parts of horse skeletons also start to appear in some of the local burials around the same time (Anthony 2007:429).

Overall, archaeologists writing about the Eurasian Steppes tend to place a rather heavy emphasis on the role played by migration processes in the MBA-LBA transition in the Southern Urals. The archaeological evidence outlined above could point to the Sintashta strongholds gradually fading out of the Southern Urals steppes due to the Sintashta populations migrating out of the area: south into Central Asia, east into Northern Kazakhstan, and west into Ukrainian and South-Russian steppes. Eventually, these migration vectors go as far as Iran and India in the south, and southern Europe in the west.

Since there are different opinions in the archaeological community on the migration-diffusion theoretical paradigm, let us examine the modern Western archaeological thought's outlook on the role played by migration processes in prehistory. With the start of New Archaeology, the migration explanations behind changes in material culture of a given society have been criticized and, for the most part, abandoned in much of the western archeological literature. European archaeologists, on the other hand, continued to consider it a useful concept when explaining cultural change (Hakenbeck 2008:9). New archaeologists' criticisms of the 'migration-diffusion' paradigm have been, for the most part, leveled at the association of archaeological cultures with specific ethnicities and with factors, other than migration, having substantial long-term effects on shaping a given culture (Hakenbeck 2008:14). Although the pre-New Archaeology explanations of material culture change due to swift massive migrations of entire ethnic groups have been discounted, the interest in human mobility processes in prehistory has started to re-emerge among western scholars since the 1990s (Anthony 1990;

Burmeister 2000). Throughout recorded history, various kinds of human migration waves have been known to take place throughout the world. The question is: to what degree can archaeologists trace possible migrations through the material record? There are different kinds of migrations and many theories explaining various instances of this phenomenon.

To the majority of Western archaeologists, the migration-diffusion explanation behind the spread of ideas and technologies during the Bronze Age throughout the steppes, utilized by Russian archaeologists, tends to be more descriptive, rather than analytical in nature. According to the migration-diffusion framework, pottery or certain types of weapons appeared in certain regions because a particular group physically migrated into the region or influenced the local population indirectly. In the lengthy cultural-historical chronicles of the Soviet archaeological literature little attempt is made to explain why the lives of the people residing in the steppes have changed. But can the migration phenomenon be totally disregarded when analyzing prehistory?

When considering the Southern Urals region, it is useful to note the relatively mobile way of life of pastoralist groups in general, and certain Bronze Age cultures of the Eurasian steppes, in particular. The concepts of human mobility and migration are closely-related, and discounting the idea of large-scale human group movements in the 'open' steppes of the Bronze Age could entail overlooking an important component of human existence. Of course, the changes in material culture of the Southern Urals during the MBA-LBA transition cannot be explained by migratory processes alone. The transformations and differences in material culture observed in the Southern Urals at various stages of the Bronze Age might have resulted from trade, diffusion, autonomous development, as well as migratory processes. In his review

of works on migration in archaeology, Burmeister (2000:540) concludes that mass migrations are extremely rare and that recent research suggests the replacement of mass migration frameworks with the notion of gradual infiltration processes taking place over centuries. "Under normal circumstances, established societies or social groups do not migrate as a whole; usually the group of migrants represents a more or less clearly defined segment of the aggregate population" (Burmeister 2000:543).

The Sintashta society seemed to be doing more than fine economically judging from elaborate sacrifices and feasting activities. Also, physical anthropological studies have indicated the absence of poor health/diet indicators among the MBA population of the Southern Urals (Kovachik and Judd 2008). Population pressure was not a likely factor in the scarcely populated steppes of the Bronze Age. Climate during the MBA-LBA transition seemed to be the best it had been in centuries. Considering the reasons for migrations include environmental shifts, economic, or population pressures (Burmeister 2000:544), Sintashta people had little reason to up and leave their homes in the steppes of the Southern Urals.

Without a doubt, smaller-scale migrations played a role in the formation and transformation of the archaeological cultures of the Southern Urals during the Bronze Age. The vast expanses of the Eurasian steppes became more open and accessible during the Bronze Age, compared to the preceding periods, due to the spreading practice of horseback riding. Human populations, encouraged by various possible stimuli began to move around, explore new territories, and, in some cases, migrate at faster rates and on a larger scale than before. Trying to reconstruct which groups migrated from where exactly and in what proportion is a laborious task, which, even if achieved, will merely describe rather than explain the processes

associated with a given time period. The following sections will evaluate other plausible explanations put forward by archaeologists about the MBA-LBA material culture transition in the Southern Urals.

5.1.3 Climatic shifts during the Bronze Age in the Southern Urals

The following section focuses on the climatic shifts taking place in the region during the Bronze Age and how these environmental changes might have influenced the MBA-LBA transition in the Southern Urals. As in many other parts of the world, the climatic environment was far from stable in the steppe and forest-steppe belt of Eurasia during the Holocene. Kremenetski (2003), by using well-dated sections of lakes, peatlands and archaeological sites was able to reconstruct the climatic changes which took place in various parts of the Eurasian Steppe belt during the Bronze Age.

Numerous climatic oscillilations took place in the Eurasian Steppes between 3200 and 600 BC, resulting in sudden changes in climate and vegetation (Kremenetski 2003:11). The period between 4800 BC and 2800 BC was characterized by a maximum spread of broad-leaved forests in the river valleys and in the forest-steppe belt of Eurasia (Kremenetski 2003:11). During this period the climate in the steppes became more benign (i.e., winters got slightly warmer while summers became cooler) and precipitation increased (Kremenetski 2003:14).

The period between 2800 BC and 2000 BC is characterized by a drop in precipitation levels, with aridity reaching maximum levels in 2000 BC. The forest cover got reduced while the climate in the steppes became drier and more continental. The period between 1700 BC and 900 BC is dubbed the “climatic optimum” by Kremenetski (2003:15), with the climate shifting to a moister and milder phase, compared to the preceding periods. The precipitation levels were

100mm higher than they are today and broad-leaved forests expanded in the forest-steppe zone of Eurasia (Kremenetski 2003:11).

Ivanov and Chernyanski (1996) provide a detailed reconstruction of the Eurasian Steppes climate over the past 6 millennia based on various paleogeographic data. Sub-boreal, a climatic stage of the Holocene which lasted from 3000 BC to 500 BC, is sub-divided into three stages: SB1, SB2, and SB3. Second and third quarters of the second millennium BC (1750-1250 BC) are characterized by the peak of climatic warming taking place during the SB2 'Thermic Optimum' (see *Table 5.1*); while the period of aridity, which reached its maximum in the Early and Middle Bronze Ages, was replaced by the moistening phase in the middle of the second millennium BC.

Based on the analysis of paleosoil samples from the MBA and LBA settlement contexts, Zdanovich and Batanina (2007:35) conclude that the part of the Sub-boreal period (SB2), during which the Sintashta culture existed, was the most arid and warm period in the Southern Urals throughout the Holocene. The disappearance of the Sintashta archaeological culture and the later formation of the Late Bronze Age cultures in the Urals took place during the moister and "more favorable" climatic conditions of the SB3 period (Zdanovich and Batanina 2007:35).

Table 5.1 Climatic fluctuations in the Eurasian Steppes (after Ivanov and Chernyansky 1996). Source: (Koryakova and Epimakhov 2007:9)

Time		Periodization					
Thousands years BP	Centuries	Geological	Thermic epochs	Epochs of humidification of Eurasian steppe	Archaeological: Epochs	Archaeological: Cultures: Eastern Europe	Archaeological: Cultures: Urals, Northern Kazakhstan
1	2	3	4	5	6	7	8
0	20	SA³	Warming	SA³ Moistening	Contamporanity		
1	15		SA³ Cooling, "minor glacial period"		Middle Ages: Late	Late Nomads	Late Nomads
	10				Middle Ages: Early		
2	5	SA²	SA² Warming, "minor climatic optimum"	"Early medieval aridization"		Huns	
	0			Early Sub-athlantic alternation of micro-pluvilas and micro-arids	Iron Age	Sarmatians: Late	Early Nomads
3	5	SA¹	SA¹ Cooling			Sarmatians: Middle	
	10	SB³	SB³ Cooling	Late sub-boreal moistening		Sarmatians: Early	
						Sauromatians	
						Scythians	
					Bronze Age: Late		
						Cimmerians	
4	15	SB²	SB² Thermic optimum		Bronze Age: Middle	Srubnaya	Sargary
	20			Early Sub-boreal aridization		Catacombnaya	Fyodorovo, Alakul, Petrovka, Sintashta
5	25	SB¹	SB¹ Cooling		Bronze Age: Early	Late Yamnaya	Tersek-Botai cultures: Late
	30					Early Yamnaya	Tersek-Botai cultures: Early
6	35	AT³	AT³ Thermic maximum	Late Athlantic Moistening	Eneolithic	Eneolithic cultures	
	40						Late Neolithic

Although there are minor disagreements in the reconstruction of the Eurasian Steppe climate during the Bronze Age, some of which might result from the scale of a given study, a few pivotal climatic shifts are evident from the above-mentioned research. The time of the Sintashta culture's existence in the Southern Urals steppes (2100 BC-1800 BC) is proceeded by an 800-year arid climatic phase, the peak of which falls on 2000 BC. The Sintashta culture's disappearance and the appearance of LBA Srubnaya-Alakul cultural complex take place during a moister climatic phase. The above mentioned researchers disagree on whether the climate during the MBA-LBA transition is yet warmer than the preceding phase (Ivanov and Chernyanski 1996), "milder" (Kerementski 2003), or "more favorable" (Zdanovich and Batanina 2007:35), with the latter two characteristics being somewhat subjective and unclear. Therefore, overall, we see the Sintashta culture developing and existing during an arid and warm climatic phase and declining during a moister period. The 'Thermic Optimum" of the SB2 period, by combining the warmness and humidity, seems so be the most favorable climatic period of the Bronze Age. One point worth mentioning is that the climatic data, outlined above, points to the moister climatic phase starting between 1700 BC-1500 BC, the time period during which the Sintashta cultural complex already disappeared from the area.

The climatic shifts mentioned above are hypothesized to play a role in the formation of Middle and Late Bronze Age cultures of the Urals. Anthony (2007:390), for instance, argues that due to the steppes becoming dryer, herder populations started building strongholds near the shrinking marshes vital for winter pasturing. These strongholds in the dry Southern Ural steppes subsequently gave rise to the Sintashta fortifications. To support his point Anthony (Anthony 2007:390) draws attention to the fact that most Sintashta settlements were built on

the river terraces overlooking marshy floodplains. By constructing fortifications near marshy meadows, the Middle Bronze Age populations of the Southern Urals protected and secured access to a critical resource necessary for survival.

An important question is how sudden or catastrophic were the climatic shifts mentioned above, and were they actually noticeable by the dwellers of the steppes leading their everyday lives? For instance, in the Volga river region, which borders on the southern Urals, the arid phase of the SB2 period ends around 1800 BC in the Middle Volga while in the Lower Volga moister climatic phase does not start until 1500 BC (Popova 2006:166). What this example illustrates is how gradual the prehistoric temperature/humidity changes were and that the arrival of climatic phases varied greatly over relatively short distances. Although the climatic shifts in the steppes were not of a catastrophic character, they still required a certain level of adjustment by the local populations.

The question is: can archaeologists predict how people in the past reacted to climatic shifts? Although ecological explanations behind human actions are oftentimes dubbed 'environmentally deterministic', numerous archaeological works utilize climatic data in explaining human adaptation to changing local environmental conditions over time. In the case of the Eurasian Steppes, for example, Koryakova and Epimakhov (2007:8) concluded that Asiatic populations of the steppes tended to adhere more to the migration model, while the Eastern European populations tended to lean toward the adaptation framework, based on climatic data (Koryakova and Epimakhov 2007:8). In their analysis the authors relied on the fact that compared to the Eastern European part of the steppe belt, the magnitude of climatic fluctuations during the Holocene were greater in the Asiatic or eastern part of the region

(Koryakova and Epimakhov 2007:8). Therefore, due to the tendency of entire ecological zones and landscapes being displaced in the eastern part of the steppes, Asiatic populations tended to adhere more to the migration model, while less volatile climatic conditions allowed the Eastern European populations to adapt to their environment without resorting to large-scale migrations.

Zhang and colleagues (Zhang et al. 2007:19214) in their examination of the effect of long-term climate change on the outbreaks of war and demographic fluctuations during the preindustrial era have found that worldwide war-peace, population, and price cycles in the recent centuries have been driven by long-term climate change. Based on the results of this study, Zhang and colleagues concluded that "climate change may thus have played a more important role and imposed a wider ranging effect on human civilization than has so far been suggested" (2007:19214). A number of cases in Asia and Europe over the last millennium, which were evaluated in this study, pointed to the fact that war outbreaks and population decline cycles occurred during cold and arid climatic phases (Zhang et al. 2007:19218).

Although the ecologically-based explanations of social prehistorical dynamics can seem overly environmentally deterministic, they cannot be totally discounted. The idea that warfare can serve as an adaptive mechanism for human societies when faced with environmental shifts or resource scarcity has been expressed by a number of scientists (Webster 1975; Galloway 1986). Unlike animals, who respond to environmental stress through migration, dietary change or population reduction through starvation, humans have a wider array of adaptation techniques to choose from, one of which is population control through warfare (Zhang et al. 2007:19214). Although warfare is a very complex phenomenon, which cannot be explained by

environmental factors alone, the aridity of the SB2 climatic stage may have had a significant impact on the people of the steppes who relied on natural vegetation to feed their livestock.

5.2 Role of metallurgy in shaping the Southern Urals society

During the MBA, even though other cultures of the steppes produced copper and bronze items, Sintashta culture possessed significant technological and locational competitive advantage over their neighbors. On a wide regional scale, cultures occupying the forest zone of the Urals and Western Siberia to the north of the Southern Urals subsided on hunting/fishing and utilized lithic technology, with the use of copper (not yet bronze) being extremely rare at any point during the 3rd millennium BC (Koryakova and Epimakhov 2007:104). To the east, in the steppes of northern and central Kazakhstan (see *Figure 5.1*), the spread of Petrovka culture (Sintashta variant) marks the spread of bronze technologies into the region (Koryakova and Epimakhov 2007:98). Abashevo culture, occupying the areas to the west and north of the Sintashta territory, did practice bronze metallurgy during the MBA, but did not have access to the rich copper ore resources of the Southern Urals. Abashevo metallurgists along with utilizing local sandstone outcrops (Koryakova and Epimakhov 2007:34), imported a substantial part of their arsenical copper from the Southern Urals (Tash-Kazgan deposit) (Chernykh 1992). Furthermore, Abashevo settlements do not contain the remains of smelting furnaces, pointing to the presence of primitive smelting constructions that would not leave a solid archaeological trace behind. In other words, Sintashta-Petrovka culture, with its advanced metal-producing technology (furnaces, two-part bellows, horizontal chimneys) (Koryakova and Epimakhov 2007:37) combined with access to superior mineral resources had no real competition in the

surrounding steppes. The only real competition, in terms of metal processing technology, came from the forest and forest-steppe zones to the north in the form of the Seima-Turbino metallurgical impulse, which will be discussed in detail shortly.

On the local scale, populations residing in the Sintashta-Petrovka fortified settlements were the only known metal producers in the steppes of the Southern Urals during the MBA. Other aboriginal mobile pastoralist and hunter-gatherer groups, which later comprised the Srubnaya and Alakul populations of the Southern Urals lived in the local steppes during the MBA as well, but did not produce bronze. These populations converted to a sedentary mode of living and began practicing metallurgy on a wide scale during the LBA, when relatively high-quality metal processing began being performed not by distinct communities, like Sintashta, but by virtually every village autonomously.

5.2.1 Craft specialization and social structure

Epimakhov (2002:77) put forward a hypothesis about the Sintashta culture, in the process of migrating into the Southern Urals, transforming the nature of metal production from a sub-culture within a society into a "system-shaping" characteristic of an entire society. According to Epimakhov (2002:77), the control over metal production knowledge and metallurgical resources is what, in a lot of ways, shaped Sintashta. During the occupation of new territories, Sintashta society became highly "militarized", with warrior elites ultimately controlling the monopoly over the exclusive knowledge and resources necessary for metal production. Sintashta strongholds were concentrated in the Southern Urals in order to control access to copper ore, while the fortified settlements themselves kept the exclusive secretive metal-producing knowledge from spreading to the neighboring tribes. In this context, Sintashta

is viewed as a society in of itself and also as a segment of a larger Southern Urals community. Metal-producing knowledge was widely spread (universal) within the Sintashta society but its spread was restricted to other groups residing in the steppes of the Southern Urals.

The tendency to keep the process of bronze item production, especially weapons, secretive is also observed in the later Seima-Turbino phenomenon, which will be discussed in detail in the following section. Chernykh (1992:231) believes that this warrior bronze-smith culture of the LBA practiced a strict taboo on the distribution of its weapons among foreign tribes. In the regions through which the supposed Seima-Turbino migration swept through, their metal processing technology was not adapted right away by the local tribes but after a significant time period had elapsed (Chernykh 1992:231).

Epimakhov's hypothesis about metallurgy being an important factor in shaping the Sintashta society finds parallels among other metal producing societies of the world. A prime example is the Barongo society of iron producers in Africa. Barongo is the name of a group of iron smelters and forgers in Africa who identify themselves as separate from other tribes in the area and use a distinct lexicon (Schmidt 1996:77). Although not an ethnicity per se, as a lot of western ethnographers have supposed for a long time; the Barongo group possesses a distinct cultural identity that stems from the practice of iron smelting. Barongo reside and work deep in the forest and are seen as mysterious and dangerous by the neighboring tribes (Schmidt 1996:79). While the Barongo groups keep their technology secret by living deep in the forest, the Sintashta culture constructed fortified settlements to keep the process of metal production out of the view of curious neighbors.

Furthermore, the process of iron production is surrounded by mysticism and is a highly ritualized activity in a number of African societies (Schmidt 1996:16). The access to the technical and ritualistic knowledge connected with the metallurgical activities is restricted by kinship ties, clan membership, gender, age, and other criteria (Schmidt 1996:14). Iron smelters in traditional African societies possess a significant amount of wealth and power, compared to people practicing other trades. Social groups restrict access to the metal processing knowledge in order to maintain a certain level of monopoly over an important economic enterprise (Schmidt 1996:14). Without a doubt, Sintashta smiths also enjoyed a great level of wealth and power stemming from their bronze smelting technological knowledge. It is possible that once the monopoly over metallurgical knowledge started crumbling due to the appearance of alternative ore sources and the development of alternative metal processing techniques, Sintashta society started losing its power and eventually ceased to exist altogether.

According to the Marxist framework, relations in production shape a given society. "As individuals express their life, so they are" (Marx and Engles 1967:42). Technology is a combination of practical, or material, knowledge with the esoteric knowledge, which encompasses people's beliefs and general world views (Dobres 2000:104). Society is an integrated system, where the technological, symbolic, and ritual aspects cannot be examined as separate from each other, with technological practices and end products expressing world views and cultural values (Dobres 2000:100). In other words, specialized craft production was more than a mere economic activity for the metallurgists of the steppes. Technological expertise and production activities connected with metal production must have played a great role in shaping Bronze Age societies of the Eurasian Steppes.

5.2.2 Metallurgists and social status during the Bronze Age

The phenomenon of elite craft specialization and production is known to have been taking place in the Classic Maya society (Inomata 2001:321), where stone carvings, polychrome ceramics, and shell ornaments were produced by the elites. Inomata (2001:321) concludes in his study of the Classic Maya society that "skilled crafting, along with the privileged knowledge encoded in the products, formed an important part of the high culture that served to distinguish the elite from the rest of the society". Considering the Middle Bronze Age was a period during which metal processing technology was still developing and spreading through various parts of Eurasia, Sintashta bronze-smiths must have held a high, or even elite status compared to the other groups residing in the Southern Urals.

Cultural and ideological aspects can play a great role in the formation and the sustainability of a given elite group (Inomata 2001:324). Throughout prehistory, ideology and cultural values were oftentimes expressed through specific objects. By controlling the exclusive technological knowledge associated with the production of such objects, elite groups were able to obtain or sustain power in a given region. In the case of the Sintashta culture, such objects probably included various warrior attributes, such as chariots and bronze weapons found in kurgan burials. Besides the obvious military power stemming from the possession of advanced warfare technologies, warrior-like items must have been associated with a high social status and possessed a certain level of ritual significance, judging from their inclusion in burials during the Bronze Age. By keeping the exclusive knowledge necessary to produce these 'objects of power' contained within the fortified production centers, Sintashta elite group was able to sustain its power in the region.

Through prehistorical as well as historical times, folk custom has often associated metal-making with magic and ritual (Budd and Taylor 1995:133). Various definitions of the word 'metallurgy' exist; oftentimes referring to it as art, science, or craft, emphasizing a wide range of meanings metal production is still associated with in our collective consciousness. Budd and Taylor (1995:134) hypothesize about the earliest metal-makers possessing "a generalized kind of politico-religious power" with individual smiths assuming the role of a craftsman, political leader, and magician all in one person. These characteristics of how early craft technologies played into prehistoric power dynamics seem, at least in part, to be reflected in the Bronze Age cultures of the Southern Urals.

While during the MBA, Sintashta populations possessed a great amount of power and wealth stemming from the exclusive, ritualized metal-production knowledge, the LBA witnesses the emergence of massive industrial-like mining centers with little room left for exclusive craftsmanship. LBA metal processing tends to assume a form of generic production rather than craft specialization, with, as Kohl put it, "nearly every household seeming capable of working metal to some degree" (Kohl 2007:177). Besides being influenced by other factors, the key to the MBA-LBA transition seem to lie in Sintashta's loss of control over the exclusive technical knowledge associated with the production of high-status warrior items.

5.2.3 Spread of metallurgical knowledge in the Eurasian Steppes during the LBA

As previously mentioned, the MBA-LBA transition in the Eurasian Steppes was associated with the spread of the metallurgical knowledge. The Sintashta warrior elites gradually lost their dominating position in the steppes due to the strategic factors, which were previously controlled by these strongholds, losing their significance. From a worlds-systems

perspective, the Southern Urals ceased to be the 'core' area having a great amount of cultural, military, and economic influence on the bordering 'periphery' regions.

The discovery of alternative copper ore sources and the development of new bronze production technologies were important factors in shaping the Eurasian Steppes LBA cultures. A prime example of this process is the so-called 'Seima-Turbino' phenomenon sweeping through Eurasia in the beginning of the LBA. Starting around the 1800-1700 BC in the foothills of the Altai mountains located on the eastern periphery of the Eurasian steppes, an advanced tin-bronze processing tradition began to emerge (Chernykh and Kuzminykh 1989). While previous to the appearance of this metalworking tradition, arsenic-bronzes were predominant in the steppes, the Seima-Turbino metallurgists began producing high-quality tin-bronze weapons using advanced technologies such as thin walled casting forms and the lost wax method (Koryakova and Epimakhov 2007:108). The weapons of the Seima-Turbino type spread through Eurasia, reaching as far north as modern-day Finland and as far west as modern-day Moldavia (Chernykh 1989). Seima-Turbino weapons and metal processing technologies spread to the Urals as well (see *Figure 5.1*). Abashevo populations, residing in the forest-steppes to the north of Sintashta's territory, began applying Seima-Turbino's metallurgical technologies to local copper sources at the start of the LBA (Goldina 1999). Russian archaeologists speculate on the number, trajectories, and the nature of the supposed Seima-Turbino migrations, but the fact is that various archaeological cultures, including Abashevo and Andronovo, among others, were being exposed to an advanced tin-bronze, arsenic bronze, silver, as well as nephrite processing technologies between 1700 BC and 500 BC (Koryakova and Epimakhov 2007:107).

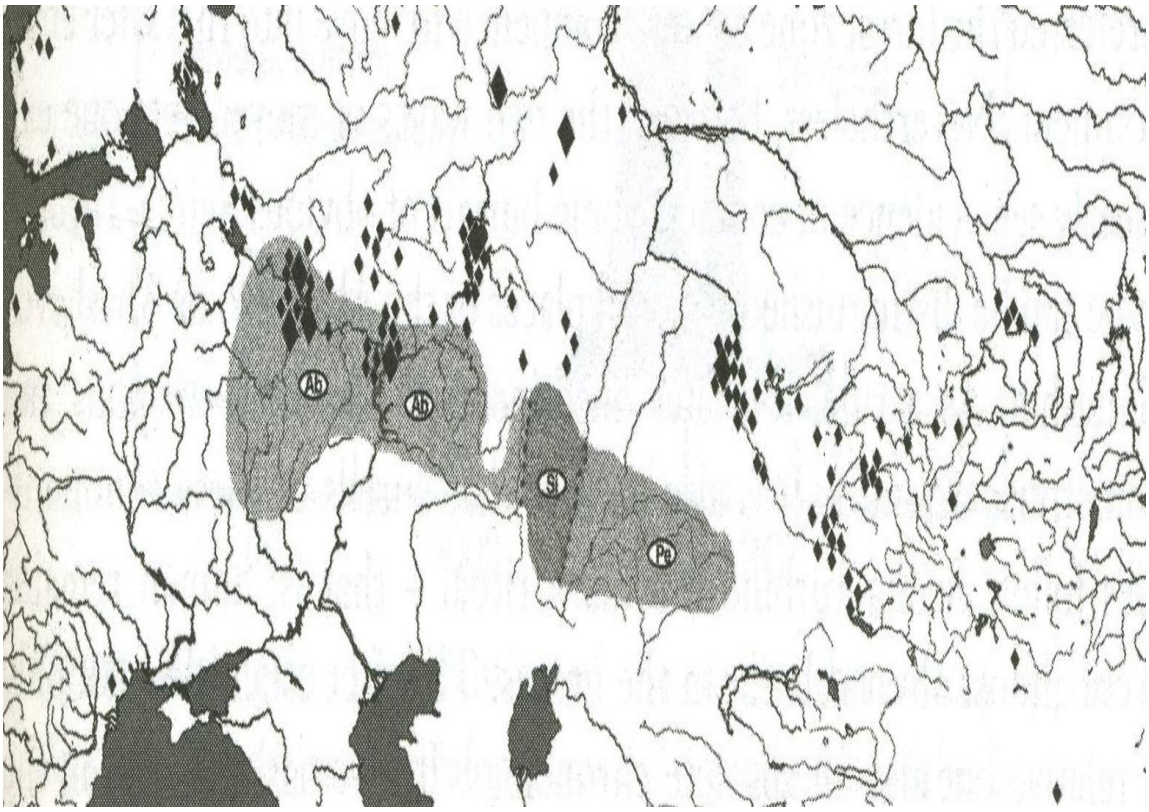

Figure 5.1 Seima-Turbino sites (represented by rhombic signs). Ab-Abashevo culture; Si-Sintashta culture; Pe-Petrovka culture. Source: (Chernykh 2009:133).

Recent radiocarbon dating project, based on samples from 40 archaeological sites located in the Southern Urals (Hanks et al. 2007), has pushed back the dates of the Seima-Turbino cultural development. Although based on a single bone sample and requiring additional dating (Hanks et al. 2007:359), the Seima-Turbino organic material dates as far back as 2140 BC (cal.), which definitely alters the 'conventional' chronological scenario outlined above. In his recent publication, Chernykh (2009:136) also pushed back the dates of the Seima-Turbino culture to 2200-1700 BC. The skillfully-crafted Seima-Turbino tin-bronze items might have influenced the Sintashta populations to move east into central Kazakhstan, closer to the local tin deposits, and improve their metallurgical technologies, thereby forming the Petrovka culture. Bigger ovens, new closed molds, new heat treatment methods, new weapons and

tools, characteristic of Petrovka settlements (Koryakova and Epimakhov 2007:41-42), might have been ways in which Sintashta-Petrovka metal smiths attempted to sustain the competitive advantage over the Seima-Turbino technologies. Again, Seima-Turbino material correlates are found in the forest-steppes and forest (taiga) areas to the north (see *Figure 5.1*), a cultural and ecological environment very different from the steppes, so the level of directness of competition or interaction between the two alternative technologies is under question.

During the LBA, the control over the metal processing knowledge and access to the mines did not benefit the Sintashta society to the degree it did in the MBA, because now there were alternative sources of both. Although a number of ancient copper mines are known to be located beyond the Sintashta territory, mainly right outside of its western periphery (Hanks and Doonan 2009), no direct evidence of any MBA mining activities at these locations has been found. According to Chernykh (1992:190) the Late Bronze Age is characterized by the discovery of hundreds of new copper-ore, tin-ore, and other ore deposits in the Urals, Sayano-Altai, Northern Kazakhstan, Central Asia, and Eastern Ukraine: virtually all over the Eurasian Steppes. "The huge scale of mining in a number of mines is astonishing" (Chernykh 1992:190). The mining and smelting traditions in the areas mentioned above serve as building blocks for the so called "Eurasian Metallurgical Province" (Chernykh 1992:190), which emerged in the steppes during the LBA and was characterized by distinct metal processing technologies. Even though in the LBA the Urals and central Kazakhstan remained large-scale exporters of copper ore to the western steppes, many local metallurgical sources and traditions began springing up throughout the steppes. In the Urals, for instance, western Ural cultures began utilizing local

copper-bearing sandstones, rather than import all of their copper from Trans-Urals (Chernykh 1992:206).

Another LBA trend entailed the overall increase in the scale of metallurgical activities. Along with the Kargaly mining complex of the Southern Urals, mentioned in the preceding chapter, specialized settlements of miners and metallurgists also began to appear further east, in central Kazakhstan (Chernykh 1992:212). The settlement of Atasu, believed to be a large center for copper smelting and the manufacture of bronze items, utilized ore transported in from the Kenkazgan mine, located over 80km away (Chernykh 1992:213). While Kargaly in the Southern Urals represented a large-scale mining operation, Atasu of central Kazakhstan, on the other hand, was a regional ore processing center.

In addition to the processes mentioned above, it appears that the Eurasian Steppes are becoming more "open" during the LBA period both culturally and economically. As stated previously, bronze weapons of the Seima-Turbino type, made using identical forging technologies and ore sources, sweep through vast expanses of land at astonishing speeds. According to Chernykh (1992:194), a thousand-kilometer tin trade route extended from Rudny Altay west into the steppes. The high level of economic and ideological interconnection among the Eurasian Steppe communities during the LBA is also evident in the high level of material culture uniformity, to the degree at which it becomes "difficult for archaeologists to distinguish individual cultures" (Chernykh 1992:194).

5.3 Conclusion

Climatic shifts and migration processes, outlined in the archaeological literature dealing with the MBA-LBA transition, did play a role in the Sintashta – Srubnaya-Alakul cultural transformation, but were not the only factors influencing this pivotal transition period. The key to the MBA-LBA transition seems to lie in the spread of the metallurgical knowledge and the discovery of alternative copper ore sources. The exclusive control over natural resources and craft production knowledge was replaced by a new social order – one characterized by the collective control over resources and the presence of an open exchange-oriented economic network. While the MBA social organization in the Southern Ural steppes had to be reinforced by warfare activities and aggrandizing ritual feasting behavior; the LBA, on the contrary, was a period characterized by a relatively peaceful economic exchange between disbursed pastoral communities.

6 Case study: MBA LBA settlement patterns in the Kyzil Area, Southern Urals

6.1 Kyzil Area: geography and brief description

The 60,000 square kilometer territory in which all of the known Sintashta fortifications were located was dubbed the “country of towns” by G.B. Zdanovich and I.M. Batanina (1995), Russian archaeologists who participated in the initial discovery of the Sintashta sites and released some of the earliest publications pertaining to them. Although according to Zdanovich and Batanina (2007:6), the term ‘country’ is used metaphorically due to the Sintashta territory having distinct geophysical borders, there is an observable tendency in some of the Russian literature dealing with the Sintashta development to overstate the complexity of Sintashta society by implying the presence of proto-city or proto-state developments in the region during the Bronze Age. The “Kyzil Area”, being an administrative unit of the Chelyabinsk District, Russia, comprises about 15% of the “country of towns” territory. The reason why this area, located in the south-west corner of the Sintashta territory, was chosen for the case study is because a detailed archaeological atlas, listing all of the known MBA as well as LBA archaeological sites, was published in 2003 (Zdanovich et al 2003). Although archaeological sites spanning from the Neolithic to the Middle Ages are featured in this publication (Zdanovich et al 2003), the atlas primarily focuses on Bronze Age settlements and burial mounds.

Although being very close to the border of the steppe and forest-steppe ecological zones (Zdanovich and Batanina 2007:33), the area under study is categorized as steppes. The ‘country of towns’ territory is defined by Russian geomorphologists as Tran-Uralian “*peneplen*”, or “slightly hilly, at times almost flat landscape, which formed on top of ancient mountain surface” (Krashennikov 1951; Sigov 1968). The physical landscape of ‘the country of towns’, in

general, and the Kyzil Area, in particular, is far from being uniform: it combines hilly and flat surfaces, grasslands and forested areas (see *Figure 6.1*). The elevation in the Kyzil Area ranges from around 100 to 1064 meters above the sea level, with a few relatively high steep hills labeled as 'mountains' on the local topographic maps (Zdanovich et al. 2003).

Figure 6.1 Trans-Ural 'peneplen'. View from the "Cheka Mountain" located in the Kyzil Area. Source: (Zdanovich and Batanina 2007:46).

6.2 Data used in the case study

The data utilized in the following case study is obtained from the "The Archaeological Atlas of Chelyabinsk District" (Zdanovich et al. 2003), published in Russian language. In the creation of "The Archaeological Atlas of Chelyabinsk District" (subsequently referred to as

Atlas), researchers utilized aerial photography as the primary remote-sensing method to locate settlements, burial mounds, and other archaeological sites in the Kyzil Area (Zdanovich et al. 2003:47). Aerial photographs, in some cases taken over the course of several decades, were examined in detail or 'decoded' to reveal archaeological sites. Follow-up helicopter flyovers, pedestrian reconnaissance activities, as well as partial excavations were performed to confirm the presence of and determine the types of individual sites (Zdanovich et al. 2003:47).

The data in the Atlas represents a detailed map of settlements, cemeteries, camps and mines ranging in time from the Neolithic to the Middle Ages. Archaeological sites, depicted on the Atlas maps are accompanied by brief descriptions, the level of detail of which varies. Due to the variability in the extent of analysis of a given site, the degree of detail concerning a site's chronology or typology varies: i.e. certain sites are assigned approximate or exact dates and others are not. The Kyzil Area is a rural region of one of the most scarcely populated countries in the world, so the level of the anthropogenic influence on most of the sites is relatively minimal, compared to other parts of the world. Due of the unique nature of the MBA and LBA dwellings and the absence of permanent settlements in the region during the EBA, the identification and chronological dating of the settlements is relatively complete and reliable.

It is important to note that the landscape of the southern Urals was different during the Bronze Age from what it is today. According to Kremenetski (2003:16), the overall vegetation cover of the Eurasian Steppes and forest-steppes became similar to that of today around 500 BC. This coincided with the end of the Bronze Age in the Eurasian Steppes, which means that present-day vegetation cover of the Kyzil Area might not necessarily reflect the ecological situation of the MBA and the LBA periods. Massive influence of human activity, whether Iron

Age large-scale pasturing or the Industrial Era's agriculture and development, on the Eurasian landscape over the past two and a half millennia also needs to be accounted for. By studying the soil erosion of the Chelyabinsk district using high-resolution remote sensing imagery, Russian scientists concluded that great masses of forests have been cut down in a number of areas, most of which were located along the left bank of the Ural river, which runs through the Kyzil Area (Zdanovich and Batanina 2007:35). On high-resolution images taken by satellites, such areas of eroded mineralized soil show up as bright-colored spots, which by means of subsequent soil analyses from the test pits, have been confirmed to be characteristic of deforestation processes (Zdanovich and Batanina 2007:34). Some scientists (Filrose 1999) go as far as stating that the Southern Urals qualified as a forest-steppe, rather than steppe prior the massive anthropogenic impact on the landscape. The issue of possible deforestation processes in connection with Bronze Age metallurgy has been brought up by researchers working in other areas of the Southern Urals. A palynological study at Kargaly, for instance, has revealed a probable connection between over exploitation of local timber resources and a decline in large scale smelting activities around 1400 BC (Vicent et al. 2006).

6.3 Case study methodology

6.3.1 GIS techniques

Besides basic GIS techniques necessary for the digitization of the data presented in the Atlas, a few GIS tools were relied upon to a greater extent in the analysis of the MBA-LBA transition in the Southern Urals. These GIS techniques are Kernel Density Estimation (KDE), Visibility (or viewshed) analysis, and the generation of Least Cost Paths (LCP) based on Cost

Surface Analysis. The aim of the study was to combine environmental and 'humanistic' factors into the analysis of the MBA-LBA settlement patterns during this transition. Out of the GIS tools utilized in the Kyzil Area case study, the Visibility and the Cost Surface Analysis techniques are more closely associated with the postprocessual approach to human action that advocates analyzing past landscape from the perspective of the individual agents performing the action. The KDE, Viewshed, and LCP techniques, which are discussed in detail below, are utilized in the analysis of settlement and kurgan distributions, with special attention paid to their relative locations to environmental resources (i.e., copper ore, wood, and water) essential for metal-processing activities carried out by Bronze Age communities.

Various sites, features, or artifacts are oftentimes represented as points on archaeological maps. In terms of settlement pattern studies, analyzing the distribution patterns of such points may, among other things, help establish the level of competition among settlements and identify emerging polities or regional centers in the area of study (Connoly and Lake 2006:163). Since this research evaluates the emergence of early complex societies in the region by utilizing settlement evidence, it is useful to examine what GIS techniques are useful in identifying point distribution patterns.

Kernel Density calculates the density of features in a neighborhood around those features (Longley et al. 2005:391). The KDE feature in GIS can be used to calculate and depict the density distribution of any point or line data, such as the density of houses, crime incident locations, roads, wildlife concentrations, etc. Density analysis allows archeologists to analyze the locational distribution of archaeological sites, features or artifacts by identifying at which locations the archaeological material tends to cluster (Connoly and Lake 2006:173). When a

substantially large quantity of target map features makes identifying individual clusters difficult, it is useful to measure the changing frequency or intensity of observations over a given area.

KDE is one of the possible density analysis techniques available through GIS. It is a sophisticated density measure, which produces smoother and more readily interpreted results than more simple density techniques (Connoly and Lake 2006:175). KDE replaces point or line data by placing a two-dimensional probability density function, referred to as *kernel* over the observed data points to create a smooth approximation of its distribution from the center of the point outward (Connoly and Lake 2006:175). The radius of the *kernel* may be manipulated to create a more smoothed or peaked distribution. KDE essentially represents an interpolation technique that aims to 'fill in the gaps' between observations to create a continuous surface.

The Kyzil Area case study examines 113 settlements and 215 kurgan cemeteries, depicted as point data on the aerial Atlas map. Since hundreds of settlements and burial mounds are spread over a relatively small area, the locations where these sites cluster or concentrate are difficult to identify without utilizing some sort of a density analysis technique. By identifying the frequency of occurrence of a given variable (i.e., settlements, burial mounds, etc.) over a specified areal unit and subsequently classifying those frequencies in a manageable number of categories, the KDE tool is able produce an easy-to-read distribution map showing the areas of high/low variable concentrations.

Another GIS technique used to a great extent in the Kyzil Area case study is the viewshed analysis. As mentioned earlier, viewshed analysis feeds into the post-processual theoretical framework by examining the way a given landscape was perceived by people in the past through the sense of vision (Witcher 1999:15). Postprocessual developments in

archaeology of the 1980's and 1990's that stressed the role of the individual as an active purposeful agent served as a precursor to incorporating the sense of vision into archaeological research (Wheatley and Gillings 2000:204). Tilley's phenomenological approach (1994:73), in particular, viewed perception as being bodily-centered and stressed the importance of bodily movement through landscape. Viewhsed analysis has also been used in establishing regional power relationships. In terms of the MBA-LBA transition case study, viewshed likely played an important role in the strategic locations of the fortified settlements.

In terms of GIS, the viewshed of a point is the set of target cells that can be seen from that viewpoint, usually assuming any two points within the viewshed are intervisible (Connoly and Lake 2006:226). The intervisiblity or viewshed analysis is very popular within the archaeological research, with studies focusing on the reciprocity of view between and within monuments, defensible constructions, burial mounds, as well as other archaeological sites (Connoly and Lake 2006:225; Jones 2006; Kay and Sly 2001). The Kyzil Area case study utilizes two types of viewshed analysis: a single viewshed and a cumulative viewshed. A single viewshed, being the simplest result of a viewshed analysis, marks target raster cells which are visible or not visible from a given point. A multiple or cumulative viewshed, being a union of two or more viewshed maps, produces an output map which contains the cells which are either visible from one or more viewpoints or not visible from any viewpoint (Connoly and Lake 2006:227).

There are numerous computational, experimental, theoretical, and substantive issues with GIS-based visibility analysis (Connoly and Lake 2006:228). Without delving into these criticisms in too much detail, a couple of issues concerning visibility analysis are worth

mentioning, as they pertain to the Kyzil Area case study. One theory-related criticism seems to undermine the viewshed analysis' association with landscape perception and, therefore, post-processual framework. Connoly and Lake (2006:232) argue that the existence of a line of site between points has little to do with perception and viewshed-based studies have frequently failed to move beyond simply establishing whether certain points are intervisible. A more of a methodological issue has to do with the so-called 'tree factor' (Wheatley and Gillings 2000:5), which refers to the presence of substantially tall palaeovegetation having a significant impact on intervisibily. While the 'tree factor' is minimal in the flat grasslands of the steppes, the fact that the Southern Urals region was more heavily forested during the Bronze Age could possibly alter the viewshed analysis outlined in the Kyzil Area case study.

The third GIS technique utilized in the Kyzil Area case study is the generation of Least Cost Paths (LCP's). Physical landscape of the earth is rarely a flat, uniform surface, where the easiest route between any two given points is a straight line. In GIS-based routeway modeling, slope is usually one of the factors which is considered costly in terms of movement, with steeper slope associated with a greater movement cost in terms of energy (Chapman 2006:107). Least Cost Path (LCP) analysis entails assigning different costs to each raster cell based on certain criteria and then calculating the easiest fastest route between the source point and the destination. Out of all possible routes between the two points, the LCP will identify a pathway which incurs the least cumulative value in relation to the cost surface (Chapman 2006:108). According to Chapman, traditionally, "the principal factor used in the construction of cost-surfaces has been slope" (2006:108). Although other factors likely influenced the cumulative cost of traveling through the area, for the sake of simplicity, the cost

surface used in the creation of Least Cost Paths in the Kyzil Area utilizes slope as the primary variable affecting movement across the landscape.

The LCP techniques in GIS have been criticized for their occasional inability to replicate or predict prehistorical routes due to a number of methodological and theoretical issues (Connoly and Lake 2006:254). The issues that apply to the Kyzil Area LCP analysis are worth examining in more detail. One is the accountability for various barriers or transformational obstacles (other than slope) that could impede movement. One such barrier in the steppes could possibly be rivers. Rivers considered as significant obstacles since all rivers in the Kyzil Area are relatively shallow and narrow, i.e. easily crossable by horseback riders or pedestrians possessing any kind of swimming skills. While during the hot summer months crossing rivers could be looked upon as an incentive, during the long Eurasian winters rivers in the Urals are frozen over, which makes crossing them not an obstacle.

Wheatly and Gillings (2002:157) also discuss how most cost surface algorithms use a hydrology-based framework, where least cost paths are ultimately modeled after how a drop of water placed in each cell of the raster surface would move to the lowest 'drainage point' of the study area. In terms of the Kyzil Area case study, a person on horseback is a lot different from a drop of water for a number of reasons, and the hydrology-based LCP's, which will tend to gravitate toward natural paths used by rivers, could fail to predict how a human would move through the landscape. People in the past might have not utilized the LCP's generated by archaeologists for a variety of reasons. Traveling on horseback, in particular, may entail building a specialized cost surface appropriate for this mode of transportation, which can greatly alter the direction of 'basic' LCPs based on slope.

6.3.2 Burial vs. settlement evidence

The Kyzil Area case study utilizes settlement evidence in an attempt to analyze the MBA-LBA transition in the Southern Urals. How is utilizing this line of evidence different from the prevalent methodology characteristic of the Eurasian Steppe archaeological research? As previously mentioned, Russian 'kurgan archaeology' has been preoccupied with analyzing mortuary material evidence, which can limit our understanding of the societies being studied.

There are many ways to interpret burial archaeological evidence, and as with any other archaeological technique, mortuary archaeology is accompanied by criticism and uncertainties. Some have speculated that burial ritual may reflect an idealized or mythical representation of reality and social relationships (Lindstrom 1994), while others have noted an important artistic or creative component of mortuary practices (Zdanovich 1997). Some researchers have expressed concern about archaeologists' ability to link mortuary complexity to social complexity, with status differences possibly being masked or manipulated through the mortuary ritual (Pearson 1995:1047). While being a rich potential source of data on paleodemography, social stratification, religion, cosmological interpretations and ritual practices, among other things, mortuary evidence needs to be supplemented by other forms of archaeological analyses in order to provide researchers with a more complete picture of past societies.

Settlement pattern research, carried out at varying scales, can add to the archaeologists' understanding of the social structure of a given society by using spatial relationships (Trigger 1967:152). The individual household analysis can provide archaeologists with insights about nuclear family structure, class division, and craft specialization. The study of an entire

settlement plan can help reconstruct communal organization structure, general community patterning, identify the presence of social institutions, and examine the nature of economic relationships within the community (Trigger 1967:152). And, finally, spatial relationships between different communities may provide some insights into the political organization and economic relationships on a regional scale (Trigger 1967:152).

Since the Kyzil Area case study, among other things, attempts to reconstruct general paleodemographic aspects of the MBA-LBA transition, it is worthwhile mentioning certain aspects of paleodemographic reconstructions based on mortuary remains. Paleodemographic reconstructions based on mortuary remains have been subject to a number of critiques over the last few decades, including sampling biases and measurement issues. These critiques also include fundamental analytical problems, such as the non-stationary nature of the population and the selective mortality paradigms (Millner et al. 2000).

As far as reconstructing the paelodemographic situation based on mortuary evidence within the Southern Ural Bronze Age societies, certain quantitative discrepancies are observed, which are speculated to either entail the presence of alternative burial practices or call for the reconsideration of the nature of permanent settlement sites (Epimakhov 2002:61,62). For instance, the inhumation burial statistics point to one in 8-25 people (depending on which Sintashta settlement population estimates are used) being buried in the kurgans (Epimakhov 2002:61). Epimakhov (2002:63) speculates that either forms of burial ritual other than inhumation were widely practiced by the Sintashta society, or the settlements of MBA were not permanently occupied but occasionally acted as centers of concentration of dispersed populations. The relatively low density of artifacts and the thin “cultural sediment layer” in the

settlement context may also suggest seasonal occupation of the sites (Epimakhov 2002; Kohl 2007).

What the above-cited analysis illustrates is that burial evidence alone may limit archaeologists' ability of reconstructing paleodemographic dynamics of a given time period. A more complete picture of the Southern Urals societies tends to emerge when burial data is supplemented by settlement evidence. The following sections will summarize the findings of the settlement pattern research of the Kyzil Area based on the data obtained from the "Archaeological Atlas of the Chelyabinsk District".

6.4 Research questions

Among the specific research questions addressed in the Kyzil Area case study are: the level of directness of cultural and demographic continuity between the MBA Sintashta-Petrovka and the LBA Srubnaya-Alakul populations through paleodemographic estimates based on settlement evidence; the level of possible 'proto-city' formation or urbanization processes taking place in the Southern Urals at various stages of the Bronze Age; the influence of regional natural resource distribution patterns on Bronze Age settlement location choices. Finally, the case study evaluates the possible roles played by kurgans in the lives of the people of the steppes by examining the distribution patterns of this ritual landscape component in the Kyzil Area.

6.5 Findings

The map below (*Figure 6.2*) shows the distributions of settlements in the Kyzil Area during the MBA and the LBA periods. Without any type of in-depth analysis, what the MBA and LBA settlement distribution map shows is that there are a lot more LBA than MBA settlements and that they are more evenly distributed throughout the region. This map represents the basic summary of the settlement data provided in the Archaeological Atlas of Chelyabinsk District. The following section discusses my findings/conclusions regarding the MBA-LBA transition in the Southern Urals.

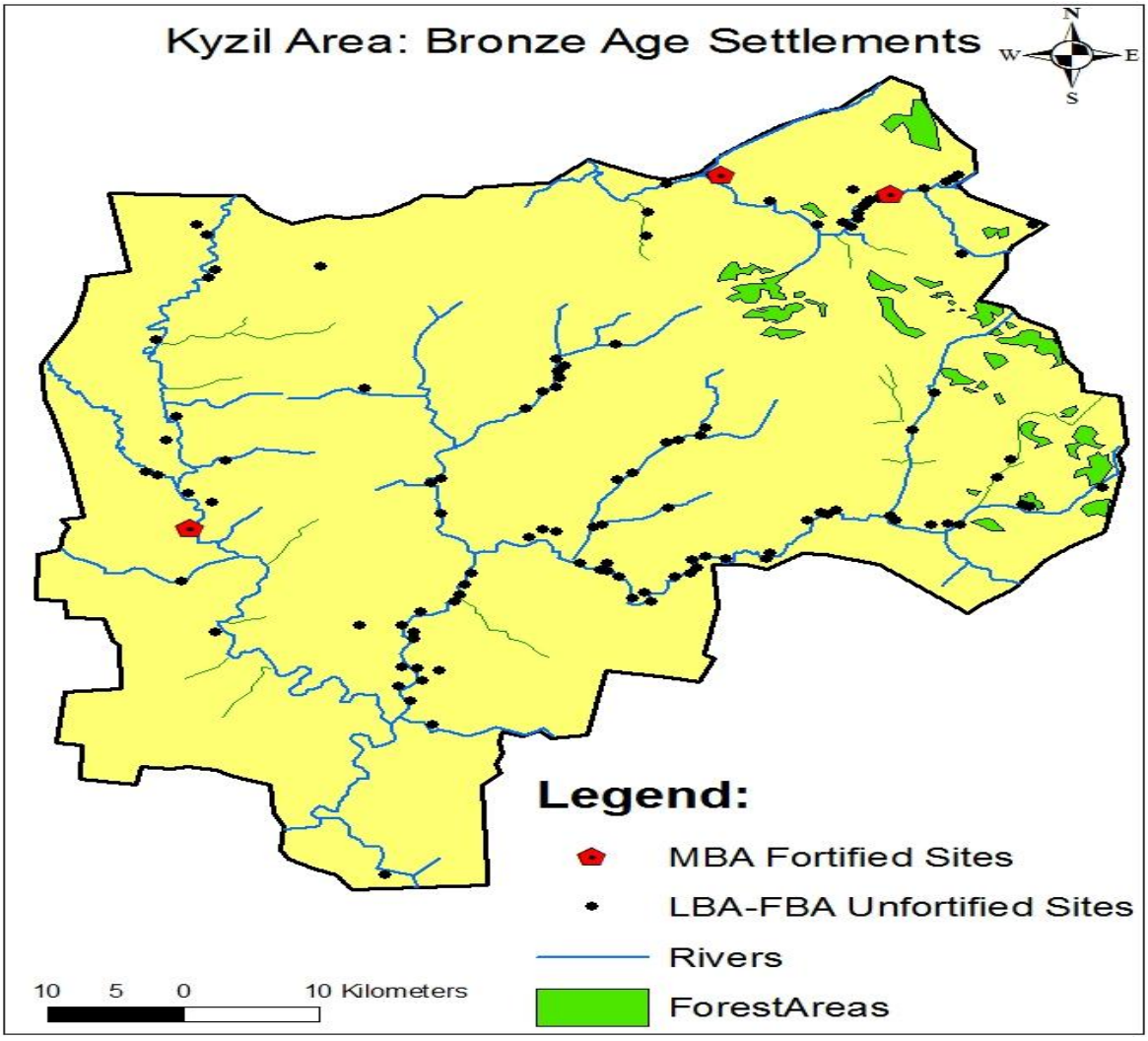

Figure 6.2 Distribution of Bronze Age settlements in the Kyzil Area

6.5.1 Paleodemographic estimates

As discussed, the Sintashta culture existed in the Southern Urals between 2100 and 1800 BC (Koryakova and Epimakhov 2007), while the Srubnaya-Alakul cultural complex existed roughly from 1800 BC to the start of the Final Bronze Age, when it began to be replaced by the Sargary culture around 1200 BC (Koryakova and Epimakhov 2007:162). Since no Petrovka sites are known in the Kyzil Area, all of the fortified settlements discussed in the case study are Sintashta sites. The exact chronologies of when the specific cultures, mentioned above, existed and to what degree they coincided temporarily are debated and are still being developed (Hanks et al. 2007). For instance, recent AMS dates indicate that Sintashta, Petrovka, Alakul, and Srubnaya might have coexisted during portions of the Middle and Late Bronze Ages in the Southern Urals (Hanks et al. 2007:362), which would alter the 'simplified' picture of the MBA-LBA settlement transition outlined in this study. Since the following study evaluates a period covering at least one millennium and full chronological control would require having radiocarbon dates from every site in the Atlas, certain chronological simplifications and assumptions are allowed in order to facilitate the analysis. Overall, the MBA-LBA transition in settlements in the Southern Urals was characterized by the transition from Sintashta-Petrovka fortified settlements to the Srubnaya-Alakul unfortified sites, and that is what the following spatial analysis focuses on.

The brief description for the overwhelming majority of the unfortified settlements in the Atlas provides "Bronze Age" as an estimated chronology. A number of unfortified settlements in the Kyzil Area that were excavated yielded ceramics typical of the LBA and FBA cultures, with stratigraphic evidence pointing to the re-occupation of certain sites during various stages of the

Bronze Age (Zdanovich et al. 2003:208). The distinct nature of Middle Bronze Age sites (i.e., fortifications) and the absence of permanent settlements in the region during the Early Bronze Age indicate that all of the unfortified sites listed in the Atlas belong to either the Late Bronze Age or the Final Bronze Age (FBA) periods. Therefore, the period over which the unfortified settlements, outlined in the Atlas were built extends to the end of the Bronze Age (800 BC). Consequently, the fortified MBA settlements ceased to exist by 1800 BC and gradually got replaced by the LBA-FBA unfortified settlements listed in the Atlas over the following 1000-year period.

The following analysis attempts to make a rough paleodemographic comparison between the MBA and LBA periods based on settlement data. More specifically, the total living space of fortified settlements is compared to the total living space of the LBA-FBA unfortified settlements. A few assumptions underlying this type of analysis are worth elaborating on before proceeding to the quantitative estimates. One issue has to do with the fact that comparing the total living space, measured as the cumulative area of housing depressions in a given settlement, does not necessarily translate into comparing the total number of people living in a settlement. The population density of the MBA settlements might have been greater, as indicated by a more compact spatial pattern of adjacent households within the 'towns' when compared to the LBA settlements. Also, a number of ethnographic and historical accounts indicate the increase in average population density among groups involved in warfare (Hodder 1986:112; McKay 1968:38). Sintashta culture of the MBA could, undoubtedly, be described as one such group to a greater extent than the subsequent Srubnaya-Alakul population.

Another issue stems from the huge time spans during which the MBA, LBA, and FBA cultures built and occupied their settlements in the Kyzil Area. What is known is that the MBA sites were built sometime between 2100 BC and 1800 BC and the LBA-FBA unfortified settlements were built and occupied sometime between 1800 BC and 800 BC. What portions of these settlements were occupied contemporaneously and at which stages of the periods mentioned above is unknown. While the issues mentioned above are significant, the following paleodemographic analysis is still quite useful when understanding the MBA-LBA transition in the Southern Urals.

According to the data contained in the Atlas, the total living area of the MBA Sintashta settlements in the Kyzil Area is 9,915 square meters, while the total living area of the later LBA and FBA settlements is 201,069 square meters, which represents roughly a 20-fold or a 1,900% increase in total living space over roughly 1000-year period. The total living area of MBA and LBA settlements was calculated by adding the areas of all individual housing depressions at each settlement. Using the McEvedy and Jones (1978:259) estimates of the world population of 27million in 2000 BC and 50million in 1000 BC, we see an 85% increase in the world population over this 1000 year period. Autonomous population growth of the Sintashta community, which would result in a 20-fold population increase over a millennium, is highly improbable. The only comparable population growth rate over a 1000-year period, which yields almost identical percentage increase in world population (around 1,900%) is over the last millennium, from AD 1000 to AD 2000 (McEvedy and Jones 1978:259). Considering the tremendous economic, technological, and medical advances of the last millennium, it is highly improbable that the Southern Urals experienced the same rate of population growth as the

world has in the last ten centuries. These types of growth rates were simply unprecedented in any parts of the world during the second millennium BC.

How does settlement data mentioned above coincide with mortuary paleodemographic reconstructions based on mortuary evidence? It is now a widely accepted consensus in the paleodemography field that the ages-at-death distributions tend to primarily indicate fertility, rather than mortality rates (Milner et al. 2000:479). Positive population growth rates increase the number of deaths at early ages relative to those at later ages (Milner et al. 2000:481). High child mortality rates, as in the case of the Sintashta burials, may indicate that birth cohorts are becoming successively bigger, indicating the process of population growth.

Sintashta burials are characterized by a high percentage of child (up to age 15) burials, which comprise on average 63.2% of the total burials (Zdanovich 1997). These child mortality parameters exceed the average percentage of child burials in prehistoric necropolises, which according to Romanova (1989:70), comprise 36.6% of the total burials. The 36.6% average is based on the paleodemographic data from over 30 ancient cemeteries from various regions of Eurasia ranging temporally from the Neolithic to the Middle Ages (Romanova 1989:70). Assuming that quantitative prevalence of child burials can be indicative of high birth rates, we may assume that the Sintashta society's population grew at rates as much as 70% higher than the surrounding groups.

If the Sintashta population grew at rates 70% higher than the rates of the population growth for the rest of the world at the time (i.e., 85% increase), that amounts to roughly a 150% increase. The LBA-FBA cultures existed in the region and built their settlements over a time period that was three times longer, when compared to Sintashta (i.e., 1000 vs. 300 years).

Also, as already mentioned, the MBA fortified settlements might have been more densely settled than the LBA-FBA sites. Considering the MBA and LBA cultures were characterized by identical subsistence practices, similar material culture complexes (Koryakova and Epimakhov 2007), and oftentimes coinciding housing depression sizes (Zdanovich et al. 2003), the population density per square meter was probably not drastically different among the Sintashta and Srubnaya-Alakul cultures.

All three MBA fortified settlements of the Kyzil Area were partially rebuilt and occupied during the LBA period (Zdanovich et al. 2003). Out of the four unfortified settlements excavated on the territory of the Kyzil Area, two yielded ceramics and other artifacts characteristic of LBA as well as FBA cultures (Zdanovich et al. 2003:208). This fact is indicative of a tendency of the Southern Urals Bronze Age populations to occupy the same housing dwellings for extensive periods of time and reduces the possibility of people building new settlements, unless necessary. This line of evidence adds credibility to the paleodemographic estimates, outlined above, by increasing the chances of contemporaneous settlement occupation of the unfortified settlements.

Epimakhov (2009:98) sites a figure of 50-years as being a possible time interval of a given settlement's occupation phase based on the average life span of a "carcass-pillar" construction. This estimate may suggest the settlement distribution of the LBA/FBA settlements being a result of a group occupying about 5 settlements at a time moving every 50 years. Even though this scenario is highly unlikely, it is important to recognize that the LBA populations could have moved at regular intervals and construct or reoccupy settlements at new locations. But so could the MBA populations, and since the aim of the study is to compare

the two periods, this tendency to relocate should be reflected equally (besides the time difference in each culture's existence) in the cumulative settlement areas of both cultures

Accounting for the demographic growth estimates (1.5-fold increase), the time-span difference (3-fold increase), and possible population density difference (3-5-fold increase) still leaves the rest of the 20-fold increase in the total living space unexplained by the autonomous population growth. What the above-mentioned statistics suggest is that the increase in the total living space of permanent housing structures was due to external demographic processes, other than autonomous population growth, taking place over the second millennium BC in the Southern Ural steppes. Such processes could have included the adoption of sedentary lifestyle by people who priory practiced a mobile lifestyle in and around the Southern Urals region, as well as in-migrations from the neighboring regions during the MBA-LBA transition.

6.5.2 Autonomous population growth vs. outside influence

Archaeologists have expressed the idea that the MBA settlements in the steppes did not house the entire population of the Southern Urals on a year-round basis, due to a significant part of the population still practicing a mobile lifestyle (Epimakhov 2002; Kohl 2007). The populations that archaeologists associate with the Sintashta material culture were not the only dwellers of the Southern Ural steppes during the MBA; they definitely co-existed with other groups. The Abashevo archaeological culture, for instance, which existed through the end of the LBA, extended partly into the Trans-Urals (Koryakova and Epimakhov 2007:57). Other western or eastern neighboring mobile pastoralist / hunter-gatherer groups might have passed through the Southern Ural steppes during their seasonal migration routes. Except for kurgans, mobile pastoralist groups tend not to leave much archaeological evidence behind, compared to

the sedentary groups, like Abashevo or Sintashta. The relative lack of material evidence left behind by nomads makes it hard to rule out the presence of mobile populations in the Southern Ural steppes during the MBA-LBA transition. Also, if Sintashta populations were the only people occupying the region, who were they guarding against by building fortifications?

The existence of cultural groups other than Sintashta in the region explains the, at first glance, abnormal post-Sintashta population growth in the Kyzil Area in terms of the settlement evidence. The mobile pastoralist / hunter gatherer groups, residing in the Southern Urals began adopting sedentary lifestyle, making the MBA-LBA transition not an autonomous development taking place within the Sintashta culture, but a more complex process in which a number of other cultural groups took part. In other words, the populations that resided in the fortified settlements during the MBA could not have grown into the LBA sedentary populations: people who did not live in any kind of permanent settlements during the MBA (nomads) settled down during the LBA.

6.5.3 Proto-cities and the urbanization hypothesis

The term 'country of towns', referring to Sintashta cultural development, in of itself influences the way one pictures the Southern Urals during the Bronze Age. Was there a country consisting of towns during the MBA, which collapsed and was replaced by the Srubnaya-Alakul villages during the LBA? Considering in Russian language there is no distinction between the concepts of 'town' or 'city', with both of these words translating as 'gorod', it is worthwhile examining the level of possible early urbanization in the Southern Urals during the various stages of the Bronze Age. These are the questions which the following section attempts to address.

Ethnographic studies indicate the population size of 30-50 people to be characteristic of a kinship group, while populations consisting of over 100 people may be indicative of a tribal social structure (Romanova 1989:74). While the definitions of what constitutes a 'tribe' or a 'kinship group' are somewhat problematic and cannot be applied universally, generally, there is a correlation between population size and social complexity (Cohen 1985; Keeley 1988). Population estimates for the Sintashata-type fortified settlements vary, from 800-900 to 2000-3000 per settlement (Epimakhov 2002:58). The low estimate is based on the absence of diseases associated with highly-dense human settlements among Sintashta skeletal remains, while the high one is based on the absolute maximum capacity of people able to reside in the settlements (Epimakhov 2002:58). Berezkin (1995), on the other hand, estimates the total realistic population of Arkaim settlement, in particular, to be 400 people, basing his conclusion on the 180-200 people/hectare population density, considered 'optimal' for the steppes. Srubnaya-Alakul settlements range from being comprised of a few houses to, in rare cases, being comparable to the Sintashta fortifications in terms of total living space. Pure Srubnaya-type settlements of the Volga region (as opposed to the Srubnaya-Alakul 'hybrid' present in the Southern Urals), for instance, are estimated to house from 120 to 150 people (Vasilyev 1989:81).

These data point to the LBA Srubnaya-Alakul population of the Southern Urals likely being comprised of multiple kinship/tribal groups, with one or two kinship groups residing in a given settlement, while the Sintashta demographic estimates indicate the presence of a chiefdom social structure in the Southern Urals during the MBA. Kinship-based community organization pattern is generally associated with a village, while the formation of a town, and

let alone a city, entails the presence of a sufficiently large and diverse population group (McIntosh 1991:203). Although population estimates do not necessitate the presence or absence of a 'proto-city' development, the above-mentioned statistics do illustrate the difference in the social structures of the two cultures, with Sintashta sites more likely qualifying as towns when compared to the Srubnaya-Alakul settlements.

While the definitions of what constitutes a prehistoric 'city' or a 'town' vary, they all entail an increasing population density at a certain location. In the case of Mesopotamian Ur and Uruk, considered to be the earliest urban centers in the world, religious temples seemed to attract rural populations from the surrounding areas (Price and Feinman 2008:440). This process of population concentration at a set location was associated with a number of economic, social, and cultural dynamics, which are today associated with city formation and the urbanization processes. While some argue that definitions of early 'cities' based on the Southwest Asian model are unilinear and monothetic in nature (Miksic 2000:106), the general principle of prehistoric urbanization entails the concentration of rural populations around temples, administrative centers, trade posts, or other socially or culturally significant territorial markers.

As mentioned above, the exact nature of the Sintashta sites is unclear and whether the MBA fortified settlements of the Southern Urals were towns or proto-cities is a subject of debate among archaeologists. It is worth mentioning, however, that the architecture of Sintashta settlements clearly points to the MBA sites in the region functioning as integrated social units. The highly uniform housing structures of Sintashta settlements shared common walls as well as a communal 'open space' at the center of every settlement (see *Figure 6.3*).

Catalhouyuk, considered by some (Price and Feinman 2008:225) to be the first 'city' in the world, had similar architecture with uniform houses built closely to one another around small courtyards. Magnoni (2006:178) in her study of the ancient Maya City of Chunchucmil, concluded that "the presence of shared boundary walls between bounded house lots clearly indicates that the city was functioning as an integrated unit".

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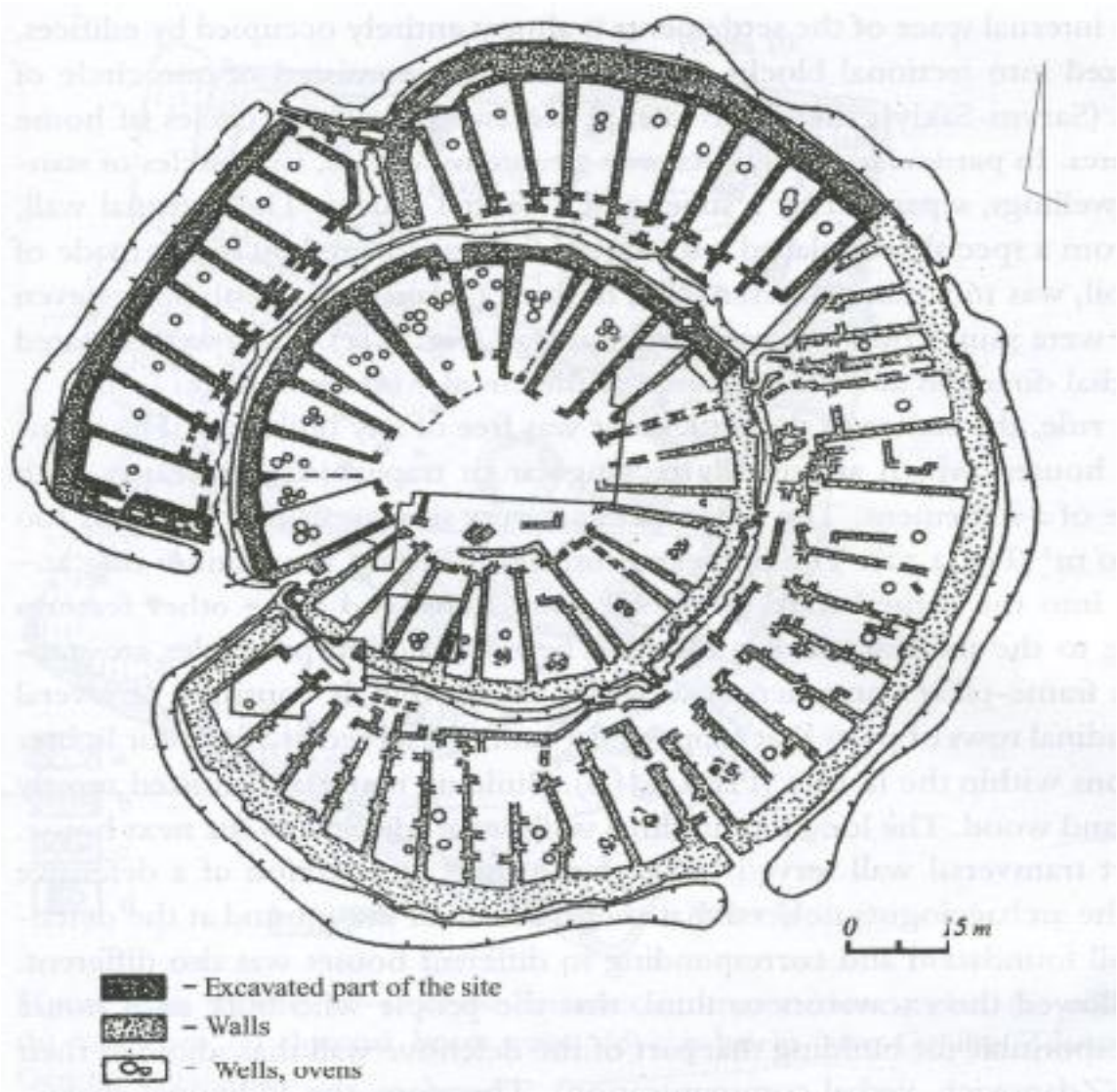

Figure 6.3 Plan of the Arkaim fortified settlement. Source: (Koryakova and Epimakhov 2007).

Although this type of collective architectural planning points to a high level of community organization and solidarity, Sintashta civic development could represent temporary clustering of households in the face of a growing threat or danger, rather than the tendency toward urbanization and the development of 'proto-cities'. African tribes, such as the Sonjo group residing in the Masai region if Tanzania, whose villages are normally thinly spread over the African plains, are known to group themselves into large communal villages consisting of 100-200 families when fearing attacks from neighboring tribes (McKay 1968:38). In the Eurasian Steppes region, Anthony (2007:281) explains the formation of the enormous Tripolye-type settlements in the 4th millennium BC and their subsequent abandonment by the warfare dynamics of the period, with population concentration being a "standard response to increased warfare".

On the regional level, the similarity in size, function, and wealth (as observed in the burial context) of the Sintashta sites point to the possible presence of a number of distinct peer polities in the region. The 'peer polity' interaction sphere, as outlined by Renfrew and Cherry (1986) presumes the presence of a number of structurally similar, autonomous social groups or communities within a region, submerged in a complex web of rivalry and cooperation relationships. In Sintashta's case, the rivalries might have taken a form or armed conflict or economic warfare activities manifested in elaborate feasting and burial sacrifice rituals among various chief-aggrandizers. The cooperation among the town-polities, on the other hand, entailed the sharing of limited copper ore resources present in the area. While a peer-polity interaction sphere is usually associated with decentralized state-like formations (Renfrew and Cherry 1986), and the 'country of towns' did not by any means constitute a state, a few

characteristics of prehistoric decentralized states are worth mentioning as they relate to the Sintashta development. According to Iannone (2002:69), among other archeological correlates, early 'segmentary' states are characterized by: (1) economic, political, and ritual redundancy; (2) widespread use of similar ritual or cult items; (3) strong emphasis on ancestor veneration rituals and other ideological practices that reaffirm lineage membership; (4) defense as the principal reason for the integration of larger kin groups. The correspondence between the characteristics of early city-states outlined above and the Sintahsta culture's material correlates point to a possibility of the presence of a peer-polity interaction sphere in the Southern Urals during the MBA.

Furthermore, the distribution pattern of the MBA settlements in the area, points to the possible existence of an "open" or "unrestricted" peer-polity interaction sphere, as outlined by Clark and Blake (2000:256), with the community territories bordering on the territories of two to six neighboring groups (see *Figure 6.4*). The 'country of towns' territory may qualify as an 'unrestricted' interaction sphere due to the non-linear nature of the distribution of its settlements, as well as the absence of natural barriers in the area (i.e., mountains, major water bodies, etc.) that could restrict the level of interaction among polities.

Theoretically, more centrally-located polities within such an interaction sphere are in a more advantageous position due to a greater possibility for inter-community contact and alliance formation (Clark and Blake 2000:256). At the scale of the Kyzil Area case study, this hypothesis seems to hold up, with the larger two of the three MBA settlements being located closer to the imagined 'center' of the 'country of towns' (see *Figure 6.5*). On the regional level, however, settlement size does not seem to correlate with proximity to the 'center' of the

interaction sphere. The fact that the Sintashta sites do not completely adhere to the Clark and Blake's model does not mean that a peer polity interaction sphere did not exist in the Southern Urals during the MBA. Many other factors, besides the proximity to the imagined 'center', could make some settlements more economically or politically successful than others. It is also important to note that the 'country of towns' architectural tradition combined at least three distinct building horizons (Zdanovich and Batanina 2007) and one should be cautious when viewing the Sintashta culture territory as a monolithic entity consisting of co-existing sites.

The evaluation of all possible hypotheses about the nature of the Sintashta sites is beyond the scope of this paper. What this research focuses on, however, is the transition between the MBA and LBA periods regarding the level of possible urbanization with the help of GIS. The 'average nearest neighbor' spatial analysis points to a clustered distribution of the LBA unfortified sites, which is not surprising because the sites do seem to be adjacent to water sources (rivers), rather than evenly disbursed throughout the area. The 'average nearest neighbor' analysis shows less than 1% chance of the LBA sites being randomly distributed. The rest of this section attempt to determine the possible tendency of the Srubnaya-Alakul sites toward urbanization by examining the LBA settlement concentration patterns.

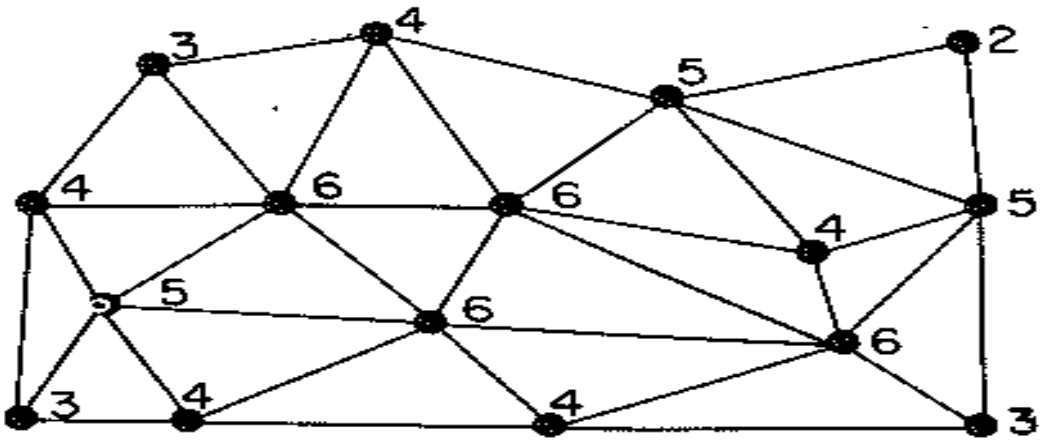

Figure 6.4 Unrestricted peer-polity interaction sphere. Numbers represent the nodes connected to each point (after Clarke and Blake 2000).

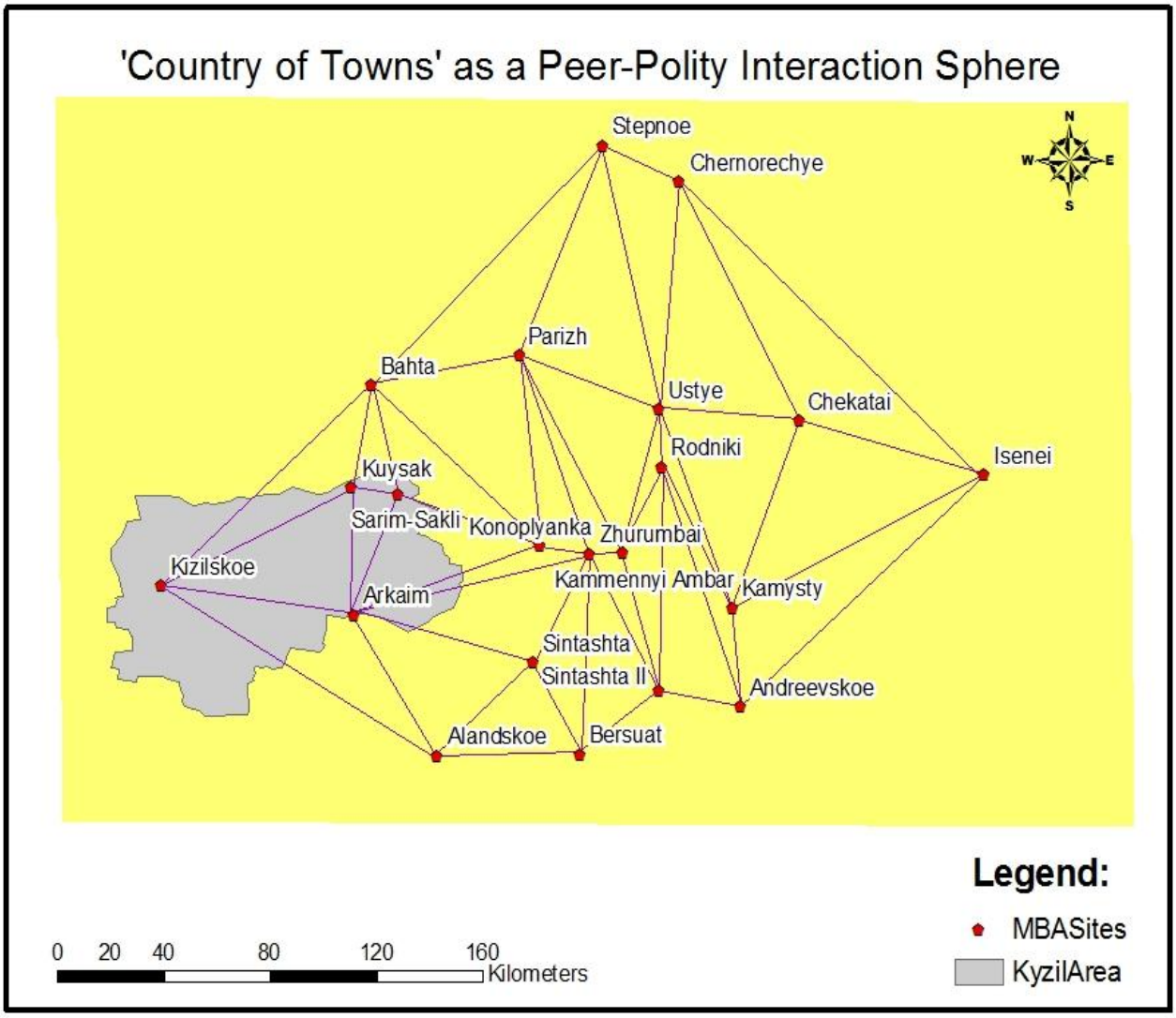

Figure 6.5 'Country of Towns' as an unrestricted interaction sphere.

While the MBA settlements in the Southern Urals had the potential to qualify as 'proto-cities', the LBA unfortified settlements did not satisfy any parameters of early urban centers. Does that mean we can safely rule out the possibility of early urbanization processes taking place in the region during the LBA period? The beginning of urbanism in West Africa (first century BC) and China (Bronze Age) was associated with the process of "urban clustering", where previously undifferentiated rural communities would form spatial clusters, consisting of physically discrete communities located in close proximity to each other (McIntosh 1991:199). Opposed to the 'traditional' urbanization models associated with early cities, at the initial stage of urbanization these community clusters functioned as a whole to provide various services to a wider hinterland, only later transforming into monolithic urban entities. Could the spatial distributions of the LBA unfortified settlements in the Southern Urals possibly qualify as early "urban clusters"?

As previously mentioned, the LBA period is characterized by the centralization of mining activities, indicated by the presence of large-scale mining complexes, such as Kargaly in the Southern Urals (Kohl 2007; Koryakova and Epimakhov 2007). Putting aside the somewhat far-fetched possibility of the presence of a "totalitarian state" in control of "gulag-type labor camps" in the area, mentioned by Kohl (2007:177), it is not unreasonable to assume that certain elite groups could have been in control of the mining activities and the resulting metal trade. Following the 'conventional' Southwest Asian urbanization pattern, the settlements where these elites resided and accumulated wealth would ultimately attract the surrounding local populations, eventually growing into cities.

Along with other criteria, such as the presence of monumental architecture, settlement size is often used to establish prehistoric settlement hierarchy (Blanton et al. 1982; Sanders et al. 1979; Turner et al. 1981), with larger higher-ranked settlements assumed to be able to provide a wider variety of goods and services to those at the lower level. A number of settlement pattern studies of the Olmec in the Gulf Coast Lowlands of Mesoamerica, for instance, have utilized a rank-size ordering system to subdivide the settlements into tiers or types to be used for further analysis (Stanley et al. 1997; Symonds and Lunagomez 1997). That is not to say that settlements occupying larger living spaces are necessarily more important or powerful, but in the cases of early urban centers, settlement size does seem to be positively correlated with military and economic power.

Popova (Popova 2006:310), in her study of the Middle Volga region, located just to the west of the Southern Urals, concluded that Late Bronze Age permanent settlements acted as ritual, political, and economic focal points, where pastoral elites resided, organized seasonal festivals, and determined land tenure. Assuming that large LBA settlements in the Southern Urals could have also served as local administrative or political centers for the rest of the population residing in the area, the 'standard' urbanization scenario would call for the gradual concentration or clustering of smaller settlements around larger ones. In the case of the early Mesopotamian cities, for instance, craftspeople and traders aimed to locate themselves closer to the places where wealth was concentrated, in order to take advantage of the growing demand for their services (Price and Feinman 2008:442). According to Kellett and Napier (1995:8), "throughout history, the poor have constructed their settlements around the urban centers of the rich and powerful".

Figure 6.6 illustrates the overall density of the LBA-FBA sites in relation to the location of the five largest unfortified sites, which are in the upper 20th percentile of the distribution in terms of the total site living area (see Appendix A). What can be concluded from this map is that the largest sites are not located in the more densely settled areas (except for *Site 4,* possibly *Site 1*), meaning smaller sites do not tend to cluster around larger settlements. Therefore, *Figure 6.6* indicates that there was no apparent trend toward urbanization or centralization in the Kyzil Area during the LBA period, where larger settlements would act as administrative or political centers in control of local resources. The assumptions about the presence of any kind of administrative elite in the area is also undermined by the high level of uniformity in settlement, burial, and other material correlates among the Srubnaya-Alakul culture (Koryakova and Epimakhov 2007). "Settlements and burials look modest, similar, and poor in terms of material culture" (Koryakova and Epimakhov 2007:120).

On the individual settlement level, in contrast to the highly-organized MBA fortifications consisting of uniform houses, the LBA sites consisted of households that varied in size (from 15 to 270 sq. m.) (Koryakova and Epimakhov 2007:114,128) and did not appear to be spatially organized into coherent residential units. The spatial organization of individual settlements, therefore, points to a more autonomous, decentralized nature of community life in the steppes during the LBA period. The lack of defensive constructions and the decline of the 'warrior' aspect of material culture during the LBA also indicate a more 'open' nature of inter-group interaction in the region during this period.

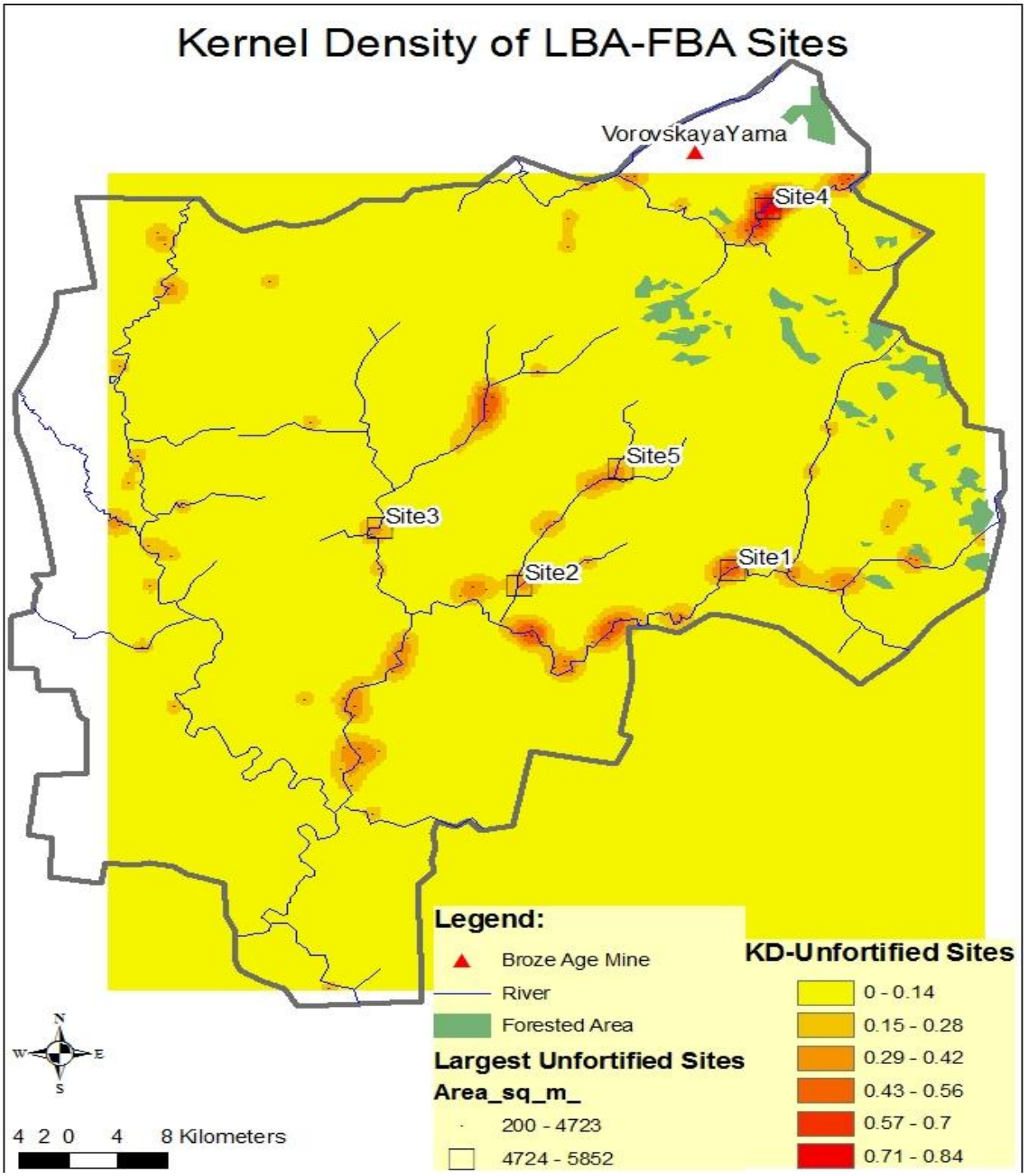

Figure 6.6 LBA settlement densities and the largest LBA sites

The viewshed analysis of the LBA/FBA settlements seems to confirm the hypothesis about the more 'open' nature of the Eurasian Steppes during the LBA period, put forward by a number of scholars (Chernykh 1992; Koryakova and Epimakhov 2007). The LBA/FBA unfortified

sites in the Kyzil Area formed a continuous chain of mutually-visible settlements, where virtually no villages were isolated from the rest of the regional community in terms of visibility (see *Figure 6.7*). This settlement pattern is contrasted by the more secretive and competitive nature of the MBA peer polity interaction sphere, where virtually no two sites were located within the visibility range from each other within the entire 'country of towns' territory.

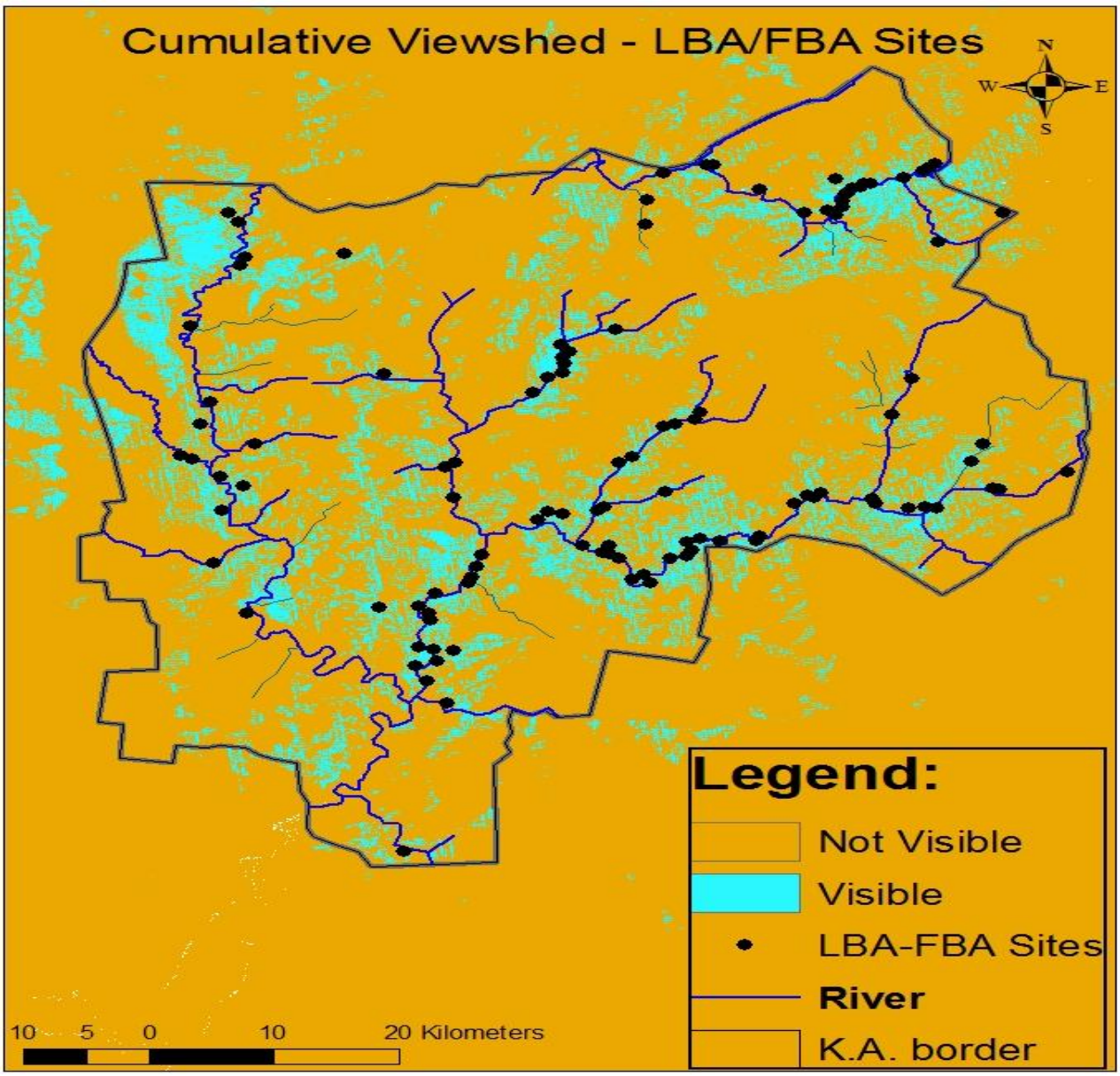

Figure 6.7 Cumulative viewshed of LBA/FBA sites

If the MBA was a period of 'proto-city' development and urbanization in the Southern Urals, it definitely did not continue into the LBA period. In many parts of the world, characterized by the presence of early cities, once a trend toward urbanization started, it continued in one form or another, ultimately resulting in state formation processes. This process of a fundamental societal transformation to urbanism was termed the 'Urban Revolution' by V.G. Childe (1950). According to Childe (1950), the effects of the 'Urban Revolution' on societies that experienced it were fundamental and far-reaching enough to make the transition to urbanization ultimately lead to the rise of the state. In this sense, the MBA was not a period characterized by the early urbanization or 'Urban Revolution' developments taking place in the steppes of the Southern Urals. The later LBA period seems to be characterized by the transition to village life, while during the subsequent Iron Age people abandon sedentary lifestyle altogether and revert back to nomadism (Koryakova and Epimakhov 2007; Zdanovich et al. 2003:217), with no observable tendency toward city or state formation.

There are a few issues with the 'Urban Revolution' approach developed by Childe that are worth mentioning for the purposes of this paper. One is that Childe did not limit the concept of 'Urban Revolution' to the development of early cities and viewed urbanization as a component of the early state formation process. Also, the concept of 'Urban Revolution' stems from the cultural evolution framework that outlines particular evolutionary stages a society goes through. Since the introduction of the 'Urban Revolution' concept into the field of archaeology, it has been recognized that the generalizations and regularities of the cultural evolution framework cannot be applied universally (Smith 2009:5).

It is important to distinguish cultural evolution, a concept referring to social change through time, from neo-evolutionism, which attempts to uniformly apply developmental stages or categories to various societies in order to measure the level of their progressiveness (Yoffee 2005:6). Does the fact that the fortified settlements of the Southern Urals did not fit into a neo-evolutionary trajectory of urbanization and state development mean they were not 'proto-cities'? Early cities and states were dynamic entities that could transform or disassemble pretty rapidly. Marcus (1992), for instance, emphasized the spatial and temporal fluctuations between centralization and decentralization in the ancient Maya state. Yoffee (2005:137) discusses the constant restructuring of the countryside and the changing power dynamics between rural communities and urban centers in the context of early states. But there was no state formation in the Southern Urals in the Bronze Age and whether using Childe's definition of 'Urban Revolution' or any other characteristics of early urban centers, the MBA fortified settlements were not cities. Whether they were 'proto-cities' that could have eventually developed into full-fledged urban centers remains a historical speculation.

Although urbanism took many forms in different parts of the world and there is no widely agreed upon definition of what exactly constitutes a city, the analysis outlined above does point to certain conclusions regarding the possibility of urbanization processes taking place in the Southern Urals during the MBA-LBA transition. The MBA settlements in the Southern Urals do not appear to be the manifestations of early cities or urban centers, but rather temporary organized clusters of households, which disassembled once the political and economic situation in the region had changed. The individual settlement size, the internal spatial organization of settlements, and the territorial distribution of individual sites all suggest

against the presence of a 'proto-city' development in the Southern Urals during the LBA. Furthermore, the LBA settlements in the Southern Urals do not seem to adhere to the early "urban cluster" model of West Africa and China, since the key to the urbanization developments in these regions connected with craft specialization at the community level (McIntosh 1991:206), which was not observed among the Srubnaya-Alakul settlements (Koryakova and Epimakhov 2007). Therefore, the MBA-LBA transition in the Southern Urals was characterized by the disassemblement of individual town peer polities and the formation of an open network of decentralized pastoralist villages.

6.4.4 New social order: collective control over resources

As stated above, neither the MBA nor the LBA settlements appear to be randomly distributed throughout the Kyzil Area. While all of the Bronze Age sites, with a few exceptions, were located next to rivers, what were some other possible locational parameters that influenced the distributions of Bronze Age sites? As mentioned in previous chapters, metallurgy played a great role in the lives of the people residing in the steppes of the Southern Urals during the Bronze Age. Bronze production, besides the obvious technical knowledge, requires access to natural resources, including copper ore and fuel necessary for metal processing.

One confirmed Bronze Age surface copper mine, Vorovskaya Yama, is located in the northeast corner of the Kyzil Area. According to geologists' estimates, more than 10 tons of bronze were smelted from the copper ore mined at this location during the Bronze Age (Zaikov 2000). As far as possible fuel sources utilized in metal processing in the Southern Urals, wood would be the most likely one, with the animal dung being an alternative extremely low in

caloric value, or energy yield, when burnt (Singh 2009:166). Besides being used for fuel, wood was the primary construction material for the Bronze Age permanent settlements (Koryakova and Epimakhov 2007). Therefore, proximity to forested areas, which are relatively scarce in the steppes, could have influenced the locational distribution of Bronze Age sites.

Figure 6.8 illustrates the distribution of the MBA fortified sites in the Kyzil area. Judging from this map, the distribution of the MBA sites in the Kyzil Area seems to be extremely recourse-oriented. Kuysak and Sarim-Sakli, the two largest MBA settlements in the region, are located in the eastern more heavily-forested part of the Kyzil Area, in close proximity to the Vorovskaya Yama mine. In the Kyzil Area, the distance to the mine seems to be inversely proportional to the settlement size (i.e., total living space) of a given MBA settlement: the closer a site is to the mine, the larger it is. Furthermore, settlement sizes seem to increase drastically with the proximity to the mine, with the Sarim-Sakli and Kyusak sites being roughly 2.5 and 3 times greater than Kizilskoe in terms of the total living space (see Appendix B). In the context of 'warrior chiefdom' societies, like Sintashta, size mattered; larger population translated into greater military strength as well as greater economic success, with more metallurgists able to produce more bronze. If settlement size did, in fact, translate into military and economic power; in the Kyzil Area during the MBA, the closer a given settlement was to the mine, the more powerful it was.

In the 'country of towns', fortified settlements are rarely located as close to each other as the Kuysak and Sarim-Sakli sites, depicted in the northeastern corner of *Figure 6.8*. Considering both of the above-mentioned sites belonged to the 'round' architectural tradition practiced in the 'country of towns' (Zdanovich and Batanina 2007), there is a high probability of

them coexisting. While normally, populations connected with Sintashta fortified sites chose to leave a space of 40 to 70 km between their settlements (Koryakova and Epimakhov 2007:68); they made an exception in the case of the Sarim-Sakli and Kuysak sites, located at a distance of less than 13 km away from each other. Out of the 21 Sintashta sites in the Southern Urals, only two other pairs of sites are located at comparable distances (around 10 km) from each other: Konoplyanka-Zhurumbai, and Zhurumbai-Kammenyi Ambar (see *Figure 6.5*), with only the latter pair belonging to the same (round) building horizon (Zdanovich and Batanina 2007). Why the above-mentioned sites were located this 'abnormally' close to each other is a topic for further research, but the clustering of the MBA in the Kyzil Area around the Vorovskaya Yama mine is quite obvious (see *Figure 6.8*).

As seen from the site distribution maps, proximity to water sources was an important factor when choosing the locations of the LBA and MBA settlements. With the average distances from settlements to the rivers in the Kyzil Area being around 500 meters during the MBA and 600 meters during the LBA periods, could the location of the Kuysak site, positioned about 760 meters away from the closest river (50% above average), be influenced by the desire of the site planners to be located closer to the mine? A number of MBA sites outside of the Kyzil Area have been actually damaged by the rivers because of their close proximity to them (Zdanovich and Batanina 2007), while the Kuysak site sits 760 meters away. The planners of the site might have attempted to balance the proximity to the river with the proximity to the mine, thereby having more direct control over this copper ore source.

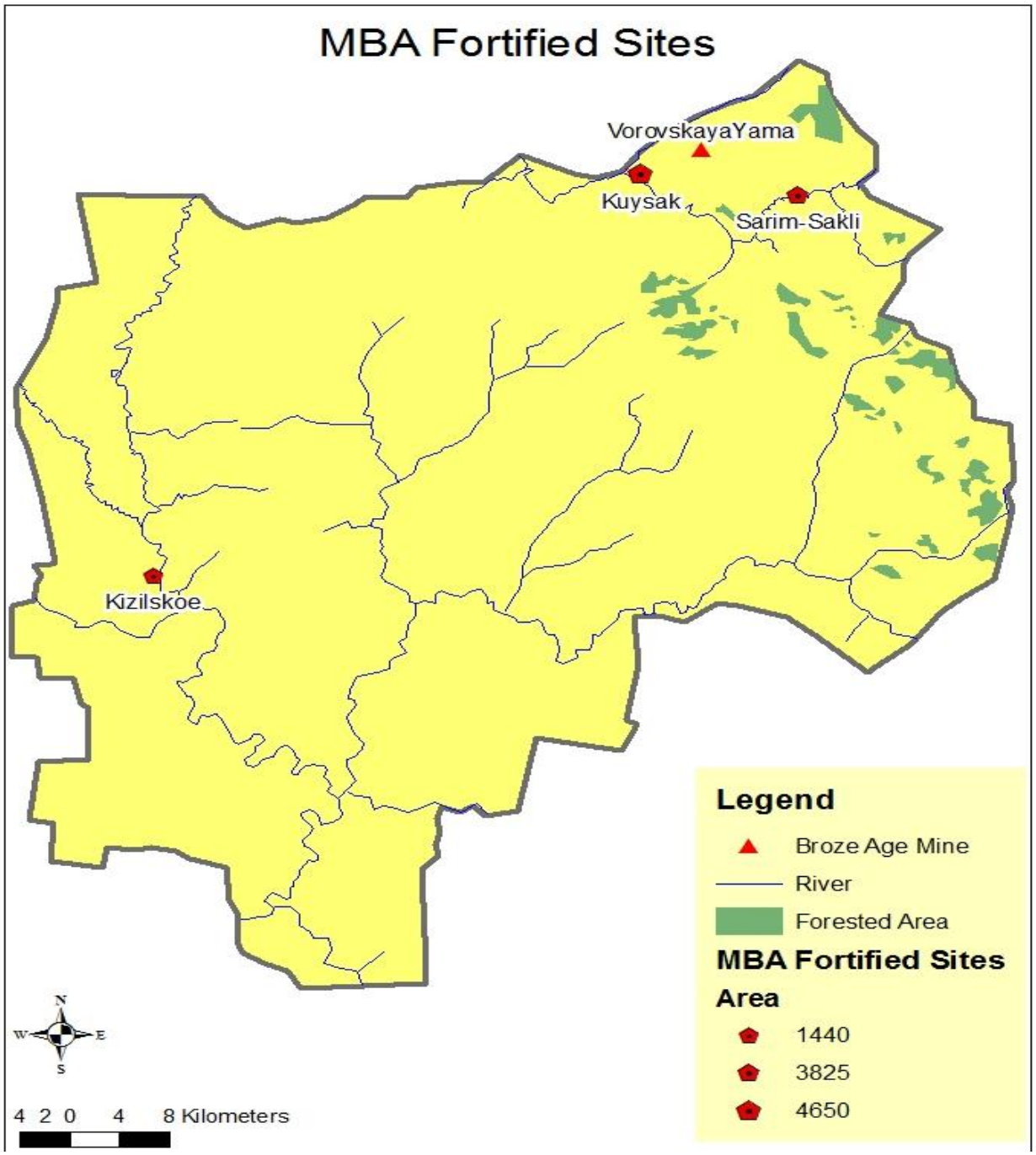

Figure 6.8 Distribution of the MBA fortified settlements

The Vorovskaya Yama mine almost falls within the viewshed of the Kuysak location (see *Figure 6.9*). The vewsheds, or visibility range of both Kuysak and Sarim-Sakli sites are depicted in the *Figure 6.10*. Judging from *Figure 6.10*, the residents of the Kuysak and Sarim-Sakli

settlements probably controlled access to the mine and could have military forces on site in a short period of time in case of an unauthorized mining attempt by the neighboring tribes.

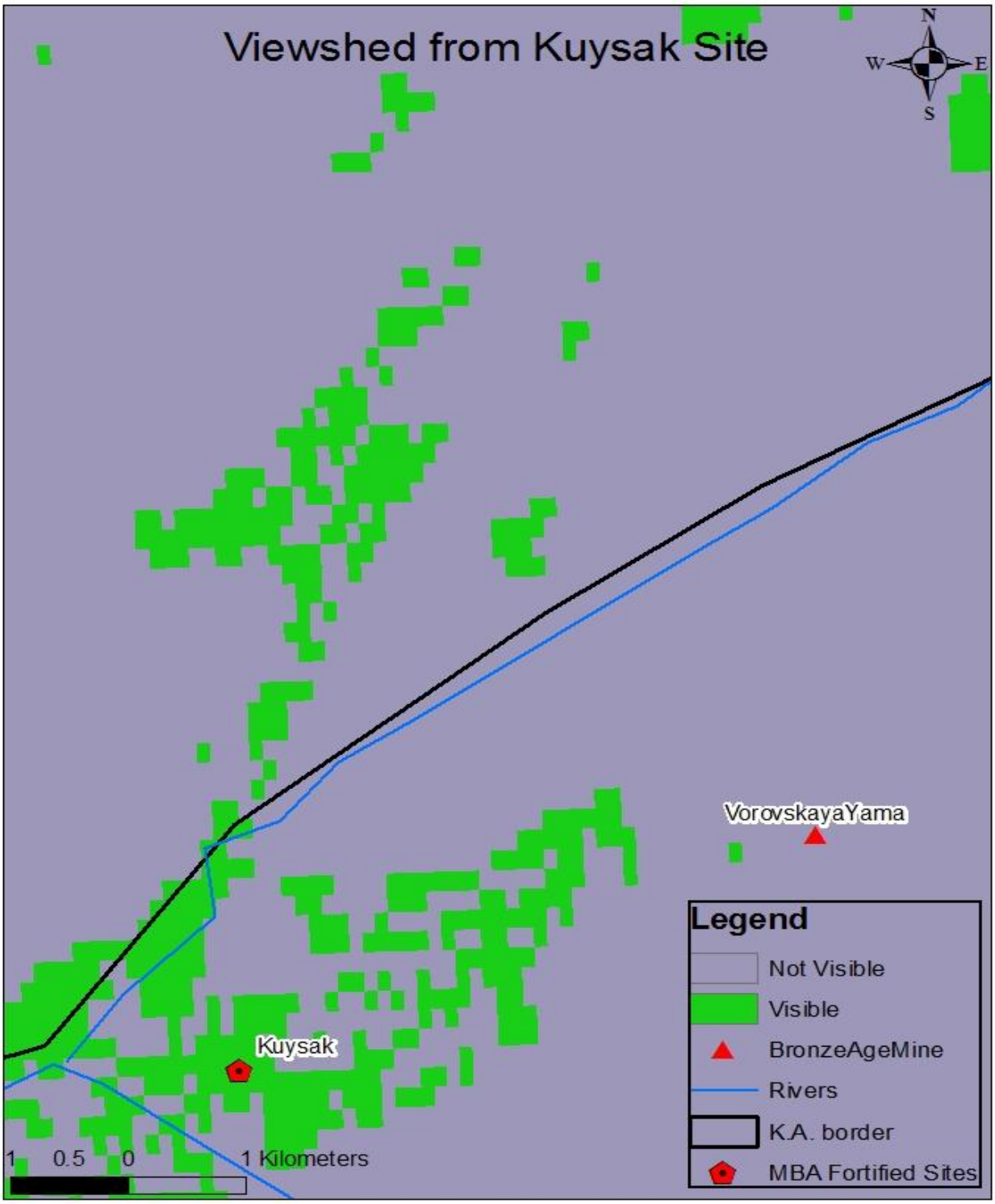

Figure 6.9 Viewshed from the Kuysak site

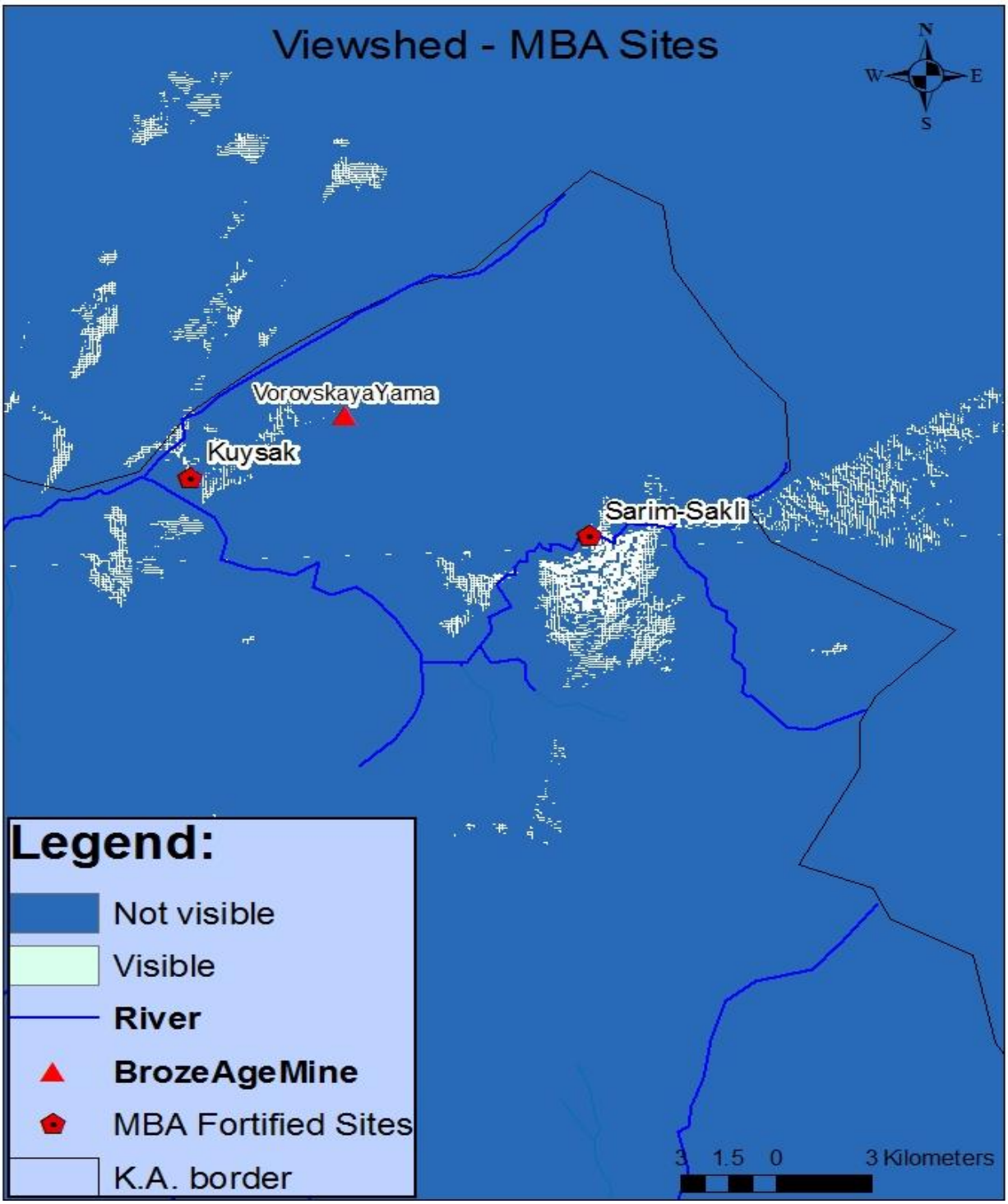

Figure 6.10 Viewshed from Kuysak and Sarim-Sakli sites

The Least Cost Paths (LCPs) based on elevation data, point to the possibility of the Kyusak settlement being located in a strategically advantageous position at the crossing of

Bronze Age communication/trade routes (see *Figure 6.11*). Assuming the MBA sites' coexistence and the presence of inter-communication among the settlements, the LCP routes from the mine to the Kizilskoe settlement, as well as from Sarim-Sakli to Kizilskoe both run in close proximity to the Kuysak settlement. Kuysak settlement, being the largest one in the Kyzil Area and the closest to the Vorovskaya Yama mine might have been a redistributive /trade center that supplied copper ore to other Sintashta settlements in the area. An important piece of archaeological evidence pointing to the possibility of the Kuysak settlement being a trade/redistribution center is a lead wire made of two braided strands that was found during the site's excavations (Anthony 2007:433). Lead was not known in the steppes as a pure metal during the MBA, while it was well known, mined, and processed at various BMAC sites (i.e., Sarazm) (Anthony 2007:433). This evidence could point to the trade between the two cultures, with Kuysak site being the point at which copper ore was mined, processed into bronze, and shipped south into the BMAC territory.

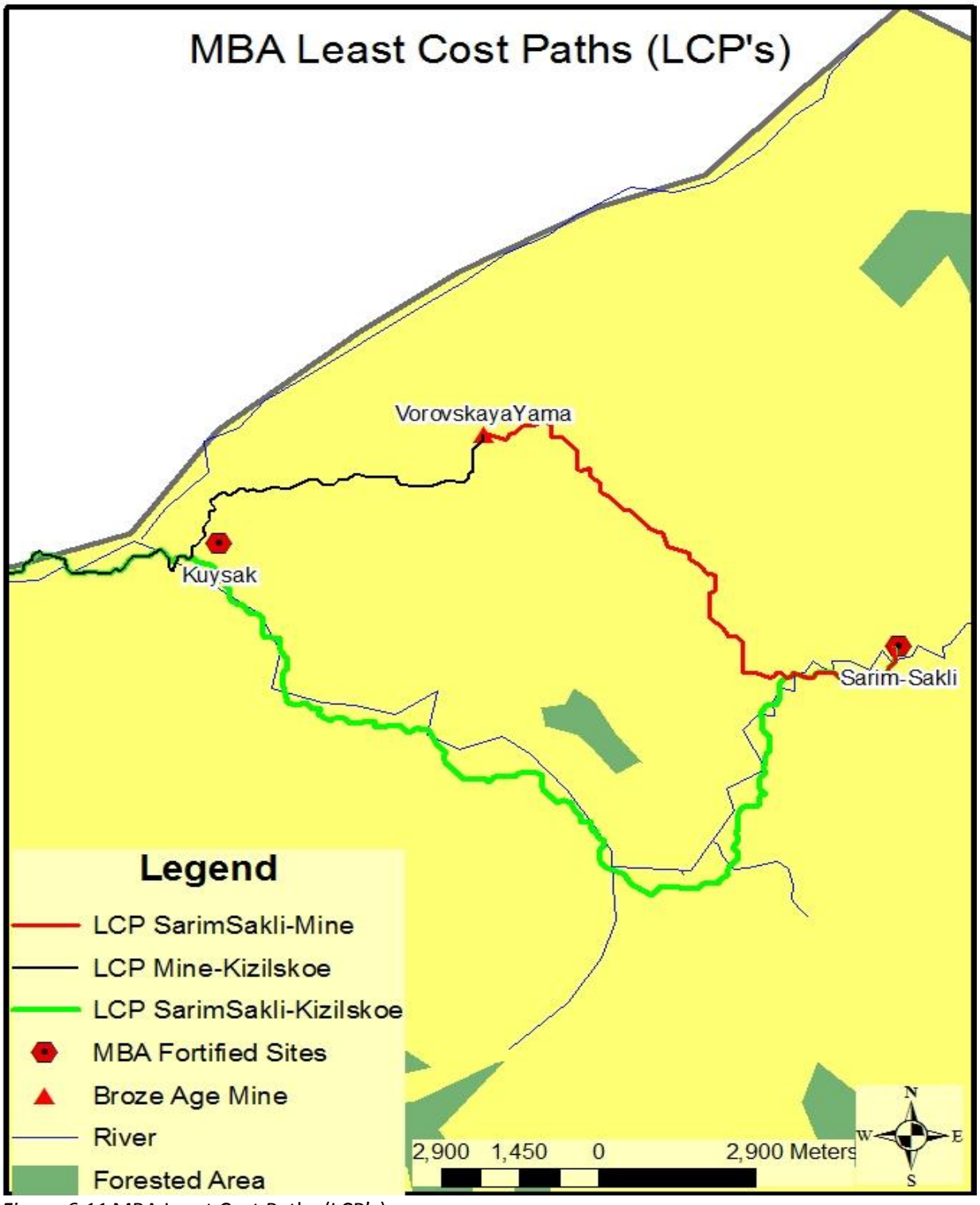

Figure 6.11 MBA Least Cost Paths (LCP's)

As already mentioned in section 6.2, the physical landscape of the Southern Urals during the MBA and LBA periods did not look the same as it does today. When evaluating the location

of the smaller Kizilskoe MBA settlement, located in the western part of the Kyzil Area, in relation to natural resources necessary for metallurgical activity, it is worth mentioning that great masses of forests have been cut down in a number of areas, most of which were located along the left bank of the Ural river (Zdanovich and Batanina 2007:35). With the Kizilskoe site being located along the Ural River, there is a possibility of the presence of forested areas in close proximity to the settlement, which could have influenced site location. The intensive utilization of wood resources by the Bronze Age populations of the Southern Urals might have led to the total depletion of the forests around the Kizilskoe settlement, with similar processes taking place in the Kargaly area around 1400 BC (Vicent et al., 2006). The proximity of the Kuysak and Sarim-Sakli sites to the forested areas is also apparent from *Figure 6.8*.

The MBA sites in the Kyzil Area seemed to be strategically located to take advantage of and control the natural resources available in the area, namely copper ore, wood, and water. The fact that larger, and most likely, more powerful sites were located closer to the Vorovskaya Yama mine, suggests the special role played by metallurgy in the life of the Sintashta society. Kuysak and Sarim-Sakli sites controlled access to the mine, while the Kuysak site possibly assumed the role of a local distribution/trade center.

Figure 6.12 shows the kernel density distribution of the LBA and FBA unfortified settlements. This density map shows the highest concentration of sites in the northeast corner of the Kyzil area, just south of the known Bronze Age Mine (Vorovskaya Yama) and in close proximity to the forested areas (*Area 1*). Overall, the LBA/FBA sites tend to be more evenly disbursed throughout the region, when compared to the MBA sites, pointing to the decreased focus on the control over natural resources, such as copper ore and wood. Numerous sites

outside *Area 1* still process metal and use wood for fuel and construction material, but they do not need to be in close proximity to these resources in order to take advantage of them.

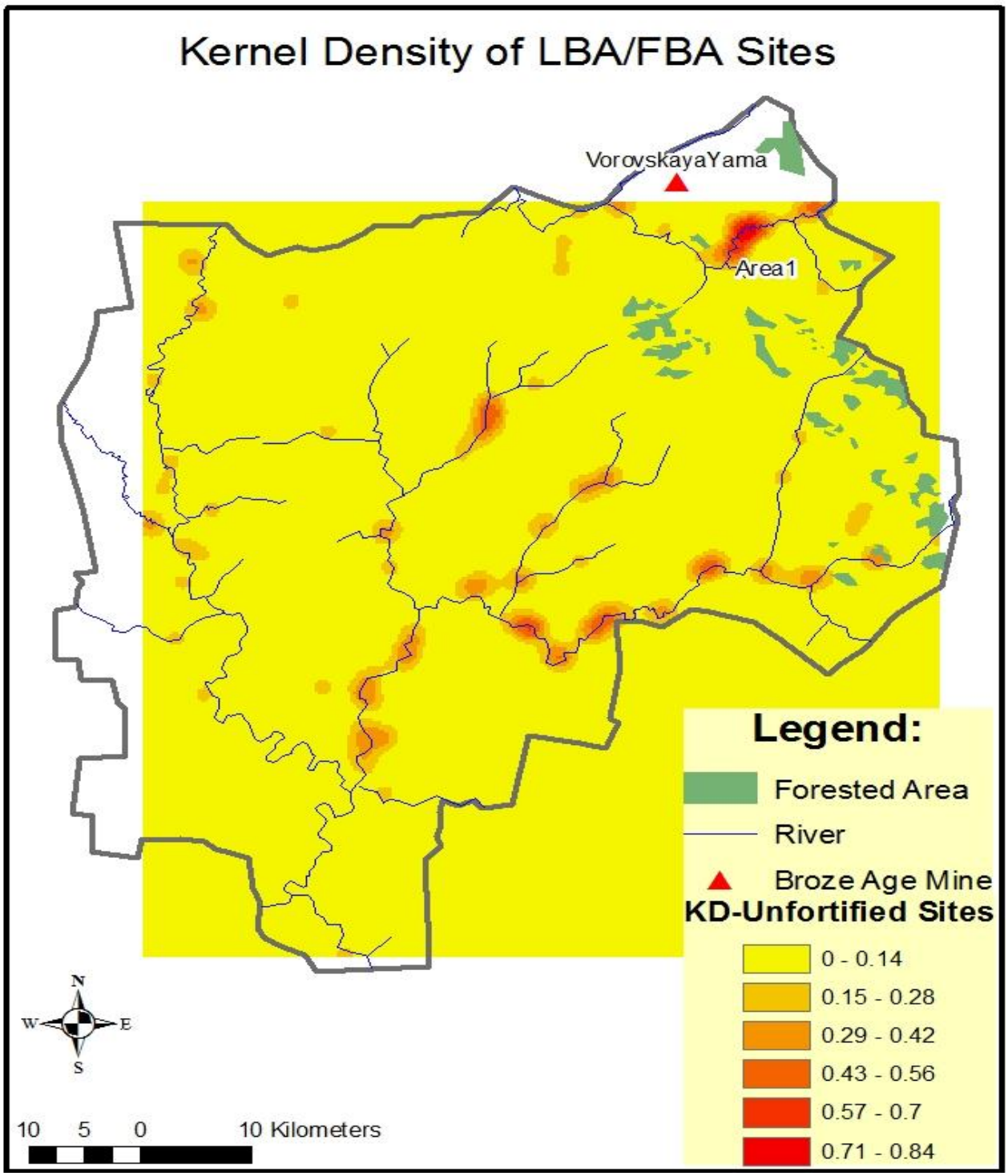

Figure 6.12 Kernel Density distribution of the LBA/FBA unfortified settlements

The less resource-oriented location of the LBA settlements is also illustrated by the greater distances from the sites to water sources (rivers) when compared to the MBA sites, with the LBA settlements, on average, being 100 meters farther from the closest river. The LBA sites, some of which are located more than a kilometer away from rivers still use water, but the site planners do not feel they need to be closer to water sources to take advantage of them; the access to this resource is shared. Again, the tendency of physical proximity to a resource being a factor determining access to the resource seems to be less pronounced during the LBA period.

The shift from a restricted to a more shared form of control over resources (i.e., decrease in the competition over resources) is also illustrated by the overall LBA settlement distribution pattern. The Ilchamus (or Njemps) people of Kenya, for example, went from living in huge defended, densely packed villages to disbursed individual homesteads around AD 1900 (Hodder 1986:111). Among other reasons for this shift in settlement patterns, Hodder (1986:112) sites the moratorium on inter-tribal cattle raids, enforced by the British. Of course, the British did not regulate the Southern Urals during the MBA-LBA transition, but the level of competition over resources seemed to decrease during that period, as evidenced by the decline in the warfare aspect of the material culture. The assumption that warfare can be equated with competition over resources stems from the fact that throughout human history, the ultimate purpose of any warfare activity, while disguised by various ideological, religious, or other motives, seemed to entail some form of competition for economic resources (i.e., land, labor, capital).

The spatial analysis outlined above may indicate the presence of some social mechanism, other than warfare, ensuring the distribution of resources throughout the Kyzil Area during the LBA period. The Srubnaya-Alakul populations did not rely on physical proximity to resources (i.e., copper ore, wood, water) to the level that the Sintashta population did during the MBA period, when determining settlement locations. Proximity to the mine, for example, did not seem to influence settlement size during the LBA period. Overall, the analysis outlined above seems to confirm the hypothesis that argues for the changing nature of control over natural resources (namely, metal ores) as one of the primary driving forces behind the MBA-LBA transition.

6.5.5 Spatial distribution of kurgan cemeteries

Eurasian steppe cultures built earthen mounds ranging from 10 m to 110 m in diameter, called *kurgans,* on top of burials (Anthony 2007:329). Kurgans, found alone as well as in groups, vary in size and location, and are generally associated with burials, sacrifices, and ritualistic activity. This form of burial was also practiced in the Kyzil Area. Numerous Bronze Age kurgans, which contributed to the creation of the local ritual landscape, were located close to settlements, along rivers, as well as in the open steppe. Besides being tombs built to house the dead, did kurgans play other roles in the lives of the people living in the Southern Urals region?

Kurgans, which undoubtedly stood out from the monotonous physical landscape of the steppes and took considerable time and energy to build, were among the earliest monuments constructed in the steppes. Monumental architecture is “defined not only by what is built but also by the interpretations – and therefore the intentions – of those who build and use it”

(Richards 2000:542). According to Kantner (2007:59), a monument is a construct of human perception of space and place, meaning and memory. Monuments, which influenced the spatial and temporal rhythms of human life, are referred to by Julian Thomas as "forces of social stability and the maintenance of tradition" and "means by which landscape was socialized" (Thomas 2001: 177). Undoubtedly, kurgans fulfilled all of the above-mentioned functions to some degree.

Earthen mounds, associated with the Native American "mound-building" tradition, some of which, like kurgans, were essentially conically-shaped burial mounds, are speculated to have reflected secular and cosmological beliefs, marked territory, and reinforced ideologies (Pauketat and Alt 2003:151). According to Pauketat and Alt, earthen mounds belonging to the Mississippian tradition were imbued with cosmological symbolism and served as "inscriptions of social memory in space" (2003:161). Kurgan burials in the steppes must have also been associated with a high degree of symbolic meaning and played a role in how ritual landscape was constructed and perceived by the local populations.

Anthony (2007:332) notes that the biggest kurgans in the Eurasian Steppes were not always built over the richest graves, with more numerous and more elaborate burial goods frequently occurring in smaller kurgans. This fact indicates a possible broader socio-ritualistic function of these constructions than simply a status marker of elite individuals buried in them. Anthony discusses kurgans possibly functioning as a claim to territory, and indicating the transition of pastures from being "wild and free" to "cultured and owned" resources (Anthony 2007:323).

Figure 6.13 illustrates the Kernel Density Estimation (KDE) distribution of the groups of Bronze Age kurgans, while *Figure 6.14* depicts the KDE distribution of all of the Bronze Age settlements in the Kyzil Area. Overall, the density distribution of settlements does not seem to correspond to the density distribution of kurgan cemeteries, except for *Area 1*. *Figures 6.13* and *6.14* illustrate that kurgan burials were not necessarily cemeteries in the modern western sense, which would entail them being conveniently located close to the settlements. The use of criteria other than the proximity to the settlements in choosing the locations for kurgan burials may indicate kurgans serving functions other than community cemeteries, such as territorial markers, or the presence of a belief system where the realm of the dead was to be kept at some distance from the domain of the living.

The domestication of the horse added a great level of dynamism to the Eurasian Steppe landscape. The patterns of movement between and around monuments probably played a major role in how the ritual landscape of the steppes was constructed and perceived. How do the Bronze Age kurgans fit into the possible communication/trade routes present in the Kyzil Area?

Figures 6.13 makes it apparent that Bronze Age kurgan cemeteries in the Kyzil Area seem to cluster around rivers. Rivers are great navigational devices and it is possible that prehistoric communication routes ran along these water bodies. If a person followed a river, knowing that the next settlement is located along it, it would have been hard to get lost, whether in the day or night time. The people of the Yurok Native American tribe, for instance, spatially place everything in terms of rivers, where up or down the river are the primary

directions (Campbell 1999:45). The Evenk people of Southeastern Siberia also practice an orientation system where the sense of direction is tied to rivers (Lavrillier 2005).

If traveling over long distances on horseback or in a chariot through the arid steppe, which the MBA as well as LBA people of the Southern Urals undoubtedly did, it made sense to stay along water bodies to hydrate your horse(s). Horses need to drink between five to ten gallons of water on the daily basis, with hydration becoming crucial for a horse after continuous exercise (Nyman 2002). Thereby, the territories adjacent to rivers, aside from being the life arteries of the steppe with respect to the settlement distribution, might have served the function of Bronze Age roads.

The least costly paths between the MBA fortified settlements obtained through running the Least Cost Path (LCP) analysis in GIS, which calculated the least costly route to travel with respect to slope, seem to, for the most part, run along rivers. Assuming that the MBA sites coexisted and there was a certain level of communication among the fortified settlements, it could be useful to examine the possible pathways between the Sintashta settlements in the Kyzil Area and how they relate to kurgan cemeteries. *Figure 6.15* depicts the LCP routes between the three MBA settlements and the Vorovskaya Yama mine with respect to the Kernel Density distribution of kurgan cemeteries in the Kyzil Area.

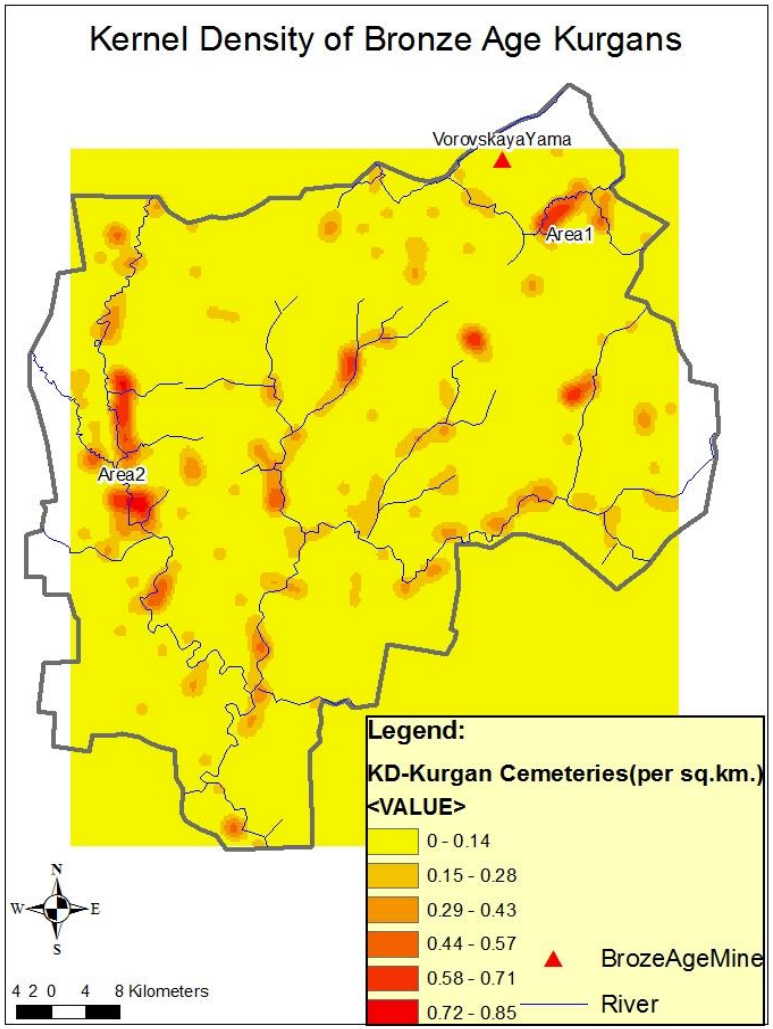

Figure 6.13 Kernel Density of Bronze Age kurgans

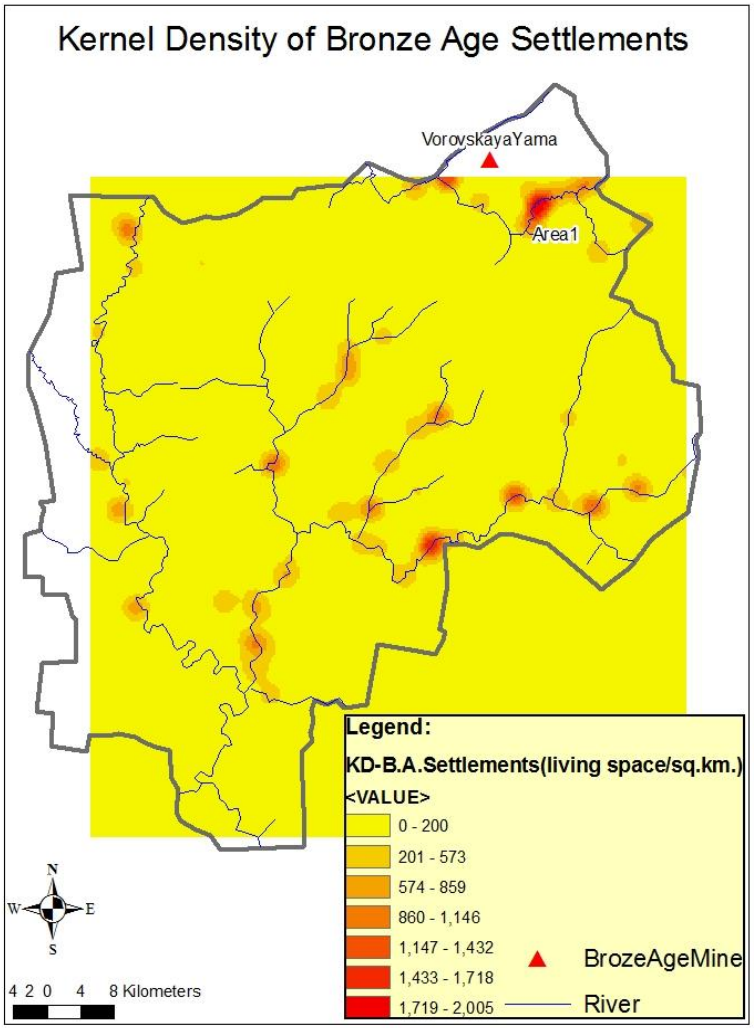

Figure 6.14 Kernel Density of Bronze Age settlements

With respect to kurgan distributions, one feature of the LCP routes, depicted in *Figure 6.15*, is peculiar. All three of the LCP routes between the three MBA settlements run through two of the most dense kurgan clusters in the Kyzil Area, pointing to the possibility that the Bronze Age cultures located their cemeteries along roads. Furthermore, archaeological data from the Atlas (see *Figure 6.16*) seems to confirm the possibility of the existence of routes connecting Kizilskoe settlement with the Vorovskaya Yama mine or other MBA settlements. *Figure 6.16* does not only indicate the presence of ancient roads starting at the Kizilskoe settlement and running in the northward direction, but also the fact that at least one of these roads went directly through the kurgan cemetery.

The practice of locating burial mounds and other memorial or ritual architecture creations along roads is apparent in other cultures. The Middle Woodland "Sugarloaf" conical mound, measuring 7 meters in height, was located along a historical Indian trail that led from an outlying Mississippian town site to Cahokia (Pauketat and Alt 2003:157). Another example comes from the Polynesian island of Rarotonga, where native populations erected marae - ritual constructions made from basalt, coral, stone or wood, which were associated with chiefly lineages, political activity ,and religious ritual (Campbell 2006:106). These marae were located along a pre-contact road encircling the island, which served as a major infrastructure construction and facilitated the movements of people, goods and information throughout the island (Campbell 2006:104).

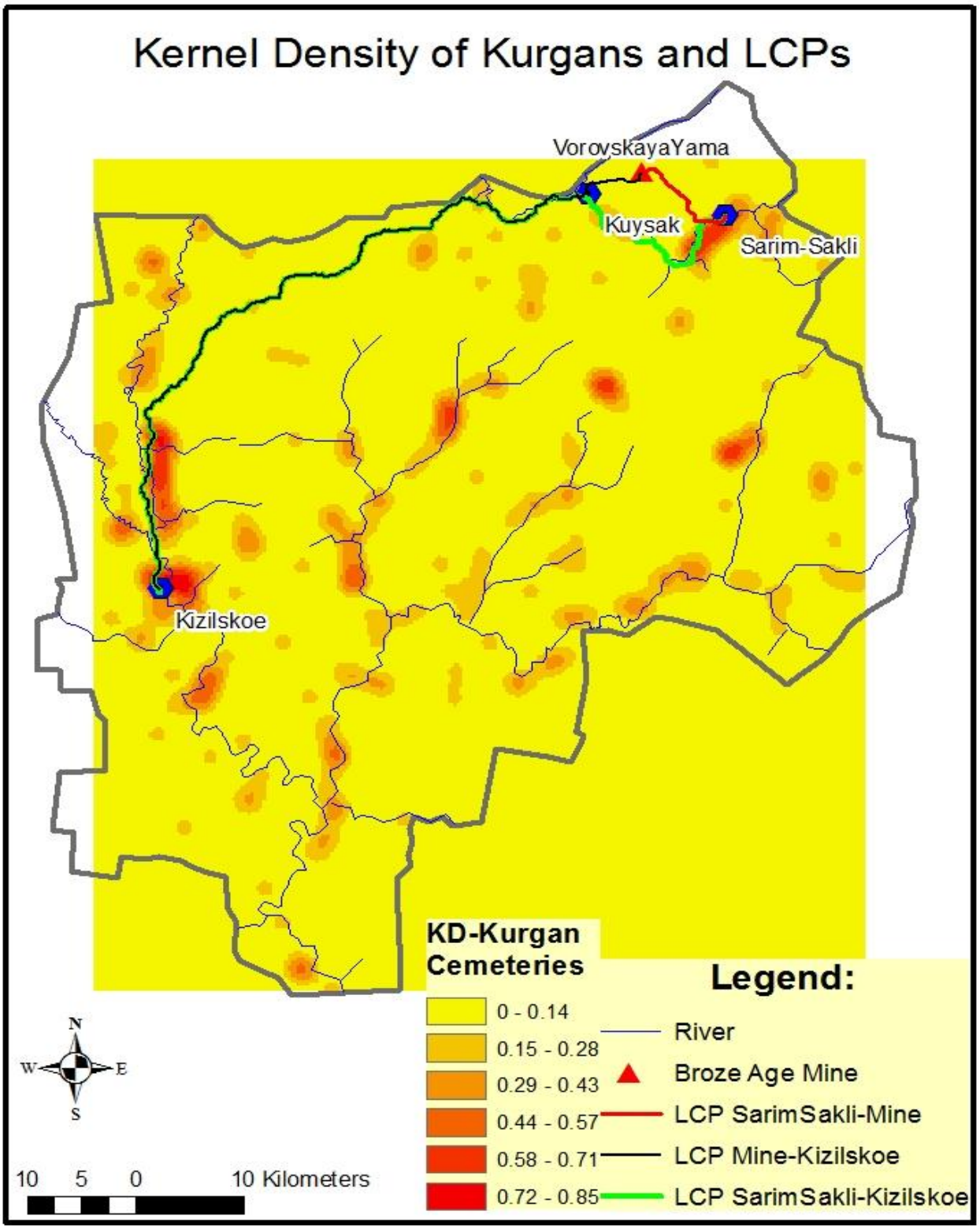

Figure 6.15 Kernel Density of kurgans and LCP's between MBA sites

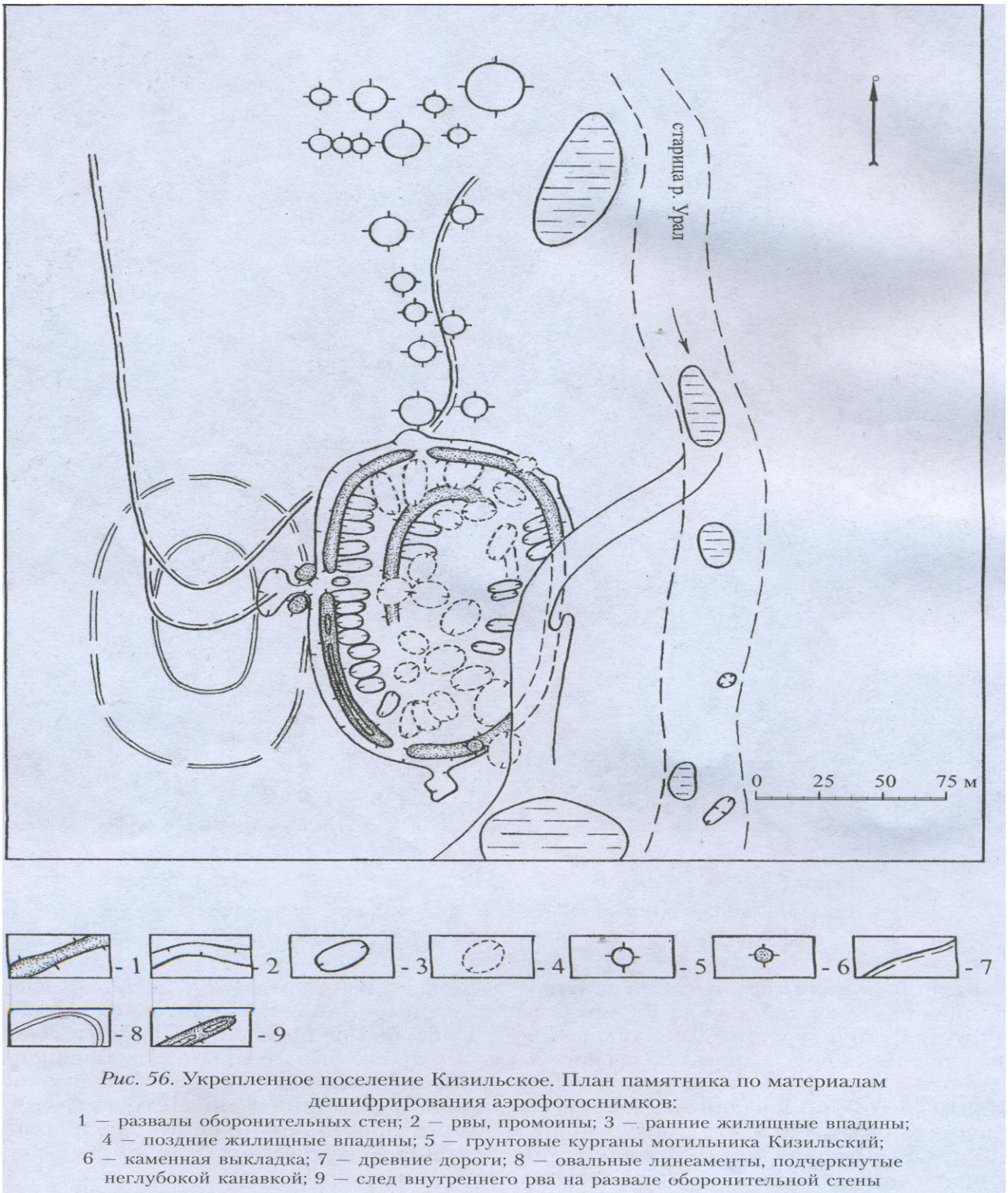

Рис. 56. Укрепленное поселение Кизильское. План памятника по материалам дешифрирования аэрофотоснимков:
1 — развалы оборонительных стен; 2 — рвы, промоины; 3 — ранние жилищные впадины; 4 — поздние жилищные впадины; 5 — грунтовые курганы могильника Кизильский; 6 — каменная выкладка; 7 — древние дороги; 8 — овальные линеаменты, подчеркнутые неглубокой канавкой; 9 — след внутреннего рва на развале оборонительной стены

Figure 6.16 Plan of the Kizilskoe settlement. 1 – defensive walls; 2 – moat; 3 – earlier housing depressions; 4 – later period housing depressions; 5 – kurgans of the Kizilskoe kurgan cemetery; 6 – stone/rock wall; 7 – ancient roads; 8 – oval linear ground depressions; 9 – internal moat. Source: (Zdanovich and Batanina 2007).

The placement of monumental architecture along heavily-used routes is associated with what Rowlands (1993:142) has termed the *inscribed memory*, or memorial practice that relies on repetition. As opposed to being secretive and infrequent, the *inscribed* memorial practice aims to integrate the ritual into daily life (Rowlands 1993:143). Bronze Age kurgans of the Kyzil Area, where the largest clusters occur in close proximity to settlements and rivers, seemed to be constructed at locations which allowed them to be visible, rather than hidden from view.

Cattle, horses, and sheep need to hydrate on the daily basis. Possible wells in the steppes could not hydrate large herds of domesticated animals, which the Bronze Age population of the Southern Ural steppes relied on almost exclusively for subsistence. Rivers, whether running parallel to the ancient roads or not, were the focal points of life in the arid steppes of the Bronze Age. The areas adjacent to the rivers were places where settlements were located and the herds had to be brought to daily for hydration. The aim of kurgan constructions, the majority of which were clustered around rivers, seemed to entail the integration of ritual memory into the daily lives of the people residing in the steppes. Bronze Age kurgan cemeteries were not constructed at some secret locations, which people would visit infrequently or on special occasion, but in heavily-frequented areas.

The “groups of kurgans” or “kurgan cemeteries”, the density distribution of which is depicted in *Figure 6.13,* are accompanied by an estimated ‘Bronze Age’ chronological attribution in the Atlas. Therefore, it is not known at this point, during which part of the Bronze Age a particular group of kurgans was erected. Considering the Southern Urals was a peripheral territory of the Yamnaya culture during the Early Bronze Age, and the population was

progressively more dense in the MBA and the LBA periods (as indicated by the settlement evidence and general population growth estimates); the majority of kurgans depicted in *Figure 6.15* were probably erected at the time of the existence of the Sintashta and Srubnaya-Alakul cultures. According to Epimakhov, massive intrusion of the kurgan ritual into the Southern Urals region took place during the MBA period, with earlier Yamnaya kurgans cemeteries being rare exceptions (Epimakhov 2002:34). Furthermore, due to a relatively short period of the Sintashta culture's presence in the area, a substantial portion of these kurgans were probably erected during the Late and Final Bronze Age periods.

As already mentioned, the density distribution of Bronze Age kurgan groups does not seem to fit the density distribution of Bronze Age settlements, over 90% of which belong to the LBA and FBA periods. According to Koryakova and Epimakhov (2007:75), Sintashta burial grounds adhered to the model "one settlement – one cemetery", with MBA kurgan burials, such as Bolshekaraganski Mogilnik, located at a distance of about one kilometer away from the fortified settlement of Arkaim. If the LBA cultures of the Southern Urals adhered to the similar spatial pattern of burial ground location, the distribution of Bronze Age kurgans would look different from that depicted in the *Figure 6.13*. The largest cluster of kurgan cemeteries seems to be located close to the Kizilskoe MBA settlement (see *Figure 6.15*). This settlement likely was the oldest permanent settlement in the Kyzil Area, since it belonged to the "oval" building horizon of the Sintashta culture, which based on stratigraphic observations, is considered to be the earliest out of the three MBA architectural traditions (Zdanovich and Batanina 2007:184). With the massive kurgan burial ritual being introduced into the Southern Urals during the MBA period (Epimakhov 2002), and the Sintashta culture constructing their cemeteries close to

settlements, the earliest kurgans in the Kyzil Area were probably erected close to the Kizilskoe settlement. Therefore, it seems Srubnaya-Alakul population recognized Sintashta as ancestors and kept adding their kurgans to the earlier kurgan cemeteries, which already existed in the area, thereby gradually forming the largest kurgan cluster, located in the western part of the Kyzil Area close to the Kizilskoe settlement (*Area 2, Figure 6.13*) .

Monument construction implies commitment to memory and to interact with monuments from the past is to engage in the act of remembrance (Campbell 2006:102). Monumental architecture, while universally linked to memory creation, may play an important role in establishing genealogy and self-identification links (Tilley 1996). In the case of Rarotongan *marae*, constructed along the main island road, monumental architecture was linked to Tangi'ia – the common ancestor of all islanders (Campbell 2006:107). The possibility of the LBA populations adding their kurgans to the existing MBA cemeteries may indicate a certain level of cultural continuity between the two cultures, with the Srubnaya-Alakul populations recognizing Sintashtians as revered ancestors.

The Kizilskoe settlement is located at the western periphery of the 'country of towns' (see *Figure 6.5*). Beyond Kizilskoe, further west laid a territory belonging to the neighboring potentially hostile tribes. The clustering of kurgans along the western Sintashta 'border' might not be coincidental. If burial mounds did serve as territory markers or claim to property as suggested by some (Anthony 2007; Pauketat and Alt 2003), it would make sense for Sintashtians to build a chain of kurgan cemeteries along the borders of the 'country of towns' to let the neighboring populations know who the territory belonged to. *Area 2* in *Figure 6.13* might represent such a 'kurgan border'. Although the distribution of cemeteries during the

MBA is assumed to follow a "one settlement-one cemetery" pattern (Epimakhov 2002), most of the kurgans in the Kyzil Area are unexcavated and it is possible that this 'rule' does not hold up in some instances. The presence of another large cluster of kurgans (largest in the area) next to the Stepnoe, northern-most Sintashta settlement (see *Figure 6.5*), confirms the possibility of kurgans serving as territorial markers. While the chronological attribution of the kurgans composing *Area 2* (see Figure 6.13) is unknown; the 'territorial marker' hypothesis would suggest most of them belonging to the MBA period, which cannot be outruled until these kurgans are excavated. Considering the possibility of most of these burial mounds belonging to the LBA or FBA populations, Sintashta's descendants might have still attempted to maintain the territorial sovereignty of the "country of towns" or simply continue adding their burials to the existing kurgan cemeteries.

In conclusion, the spatial analysis of kurgan cemeteries in the Kyzil Area confirms a certain level of cultural continuity between the Sintashta and Srubnaya-Alakul cultures, which, in turn, undermines a strictly migration-based explanation for Sintashta culture's disappearance from the Southern Urals. Kurgan cemeteries, which were erected with the intention to be seen by the local, as well as neighboring populations, possibly served as territorial or border markers. These early monuments of the steppes, a significant portion of which was likely constructed along ancient communication routes, aimed to integrate ancestral memory into the daily lives of Bronze Age populations of the Southern Urals.

7 Conclusions

Previous explanations behind the MBA-LBA transition in the Southern Urals included climate shifts and large-scale migration processes. The MBA settlements were assumed to be manifestations of early urban centers in the region, as indicated by the terms 'country of towns' and 'proto-city' used to describe the Sintashta cultural development in various archaeological literature sources. Although the increase in the intensity of the exploitation of metallurgical resources during the MBA-LBA transition has been documented throughout the Eurasian Steppes by Russian scholars (Chernykh 1992), the changing nature of control over natural resources during this period has not been examined from a settlement pattern perspective. Kurgans were assumed to serve the purpose of cemeteries or necropolises, with any other possible explanations of these monumental phenomena remaining at the level of speculation.

This thesis, and the Kyzil Area case study in particular, have attempted to address all of the issues mentioned above in an empirical manner. Various methodological and theoretical approaches associated with both Russian and Anglo-American schools of archaeological thought have been incorporates into the analysis to a varying degree. The culture-historical typologies developed by Russian archaeologists have been relied upon to a great extent in the analysis of cultural developments taking place in the Southern Urals throughout the Bronze Age. The Kyzil Area case study incorporated processual theoretical approaches into the analysis by evaluating settlement locations in relation to environmental resources and reconstructing regional paleodemographic dynamics based on quantitative settlement data. The utilization of the Anglo-American postprocessual approaches is evident in the incorporation of the GIS techniques that address phenomenological aspects of landscape perception, such as the

Visibility and Cost Surface Analyses. The examination of the role played by metallurgical craft specialization in the MBA-LBA transition could be, at least in part, attributed to the Marxist approach, utilized by Soviet as well as Anglo-American post-processual archaeologists.

What the Kyzil Area GIS-based analysis illustrated is that the transformation of the Sintashta archaeological culture into the Srubnaya-Alakul cultural complex could not have been a result of autonomous demographic growth processes. Paleodemographic estimates based on settlement evidence indicate that populations, which lived either in the "country of towns" or in the neighboring regions as mobile pastoralists during the MBA, adopted sedentary lifestyle during the LBA period. In other words, groups other than the ones associated with the Sintashta culture participated in the formation of the Srubnaya-Alakul LBA population in the Kyzil Area; and the MBA-LBA transition, in settlement terms, entailed more than people moving out of the fortified towns into unfortified villages.

The settlement evidence also points to a decreased focus on control over natural resources by individual sites during the MBA-LBA transition. Proximity to and control over natural resources, namely copper ore and wood, seemed to play a large role in determining settlement locations during the MBA period, with physical proximity to resources influencing the size and economic success of MBA sites. The LBA period was characterized by a more open access to natural resources, with proximity to a resource not being a decisive factor determining site location, settlement size, or economic success of a given LBA settlement.

Furthermore, the MBA settlements in the Southern Urals do not appear to be the manifestations of early cities or urban centers, nor is there any observable trend toward urbanization or administrative centralization in the region during the LBA. Settlement

evidence, outlined in the Kyzil Area case study, points the MBA-LBA transition in the Southern Urals being characterized by the disassemblement of competitive town peer-polities and the formation of an open network of decentralized pastoralist villages.

The spatial analysis of kurgan cemeteries in the Kyzil Area confirms a certain level of cultural continuity between the Sintashta and Srubnaya-Alakul cultures, which, in turn, undermines a migration-based explanation for Sintashta culture's disappearance from the Southern Urals. In culture-historical terms, kurgan distributions in the Kyzil Area suggest a possible 'genetic' continuity between Sintashta and the subsequent LBA-FBA cultures residing in the Southern Urals. Kurgan monumental constructions likely served as territorial or border markers and were constructed along ancient communication routes, thereby integrating ancestral memory into the daily lives of Bronze Age populations.

While climatic shifts and migration processes played a role in the lives of the Southern Urals populations, what, for the most part, drove the MBA-LBA transition was the spread of metallurgical knowledge and the discovery of alternate copper ore resources in various regions of the Eurasian Steppes. Sintashta fortified settlements ceased to exist because they lost their monopoly over technical knowledge and resources necessary for bronze production. Social mechanisms other than warfare began playing a bigger role in resource distribution activities during the MBA-LBA transition.

The data, relied upon in this work, is somewhat incomplete and could definitely be expanded upon for the purposes of future follow-up research. One aspect has to do with the methodology utilized in creating the Archaeological Atlas of Chelyabinsk District. The methods used in locating archaeological sites, other than kurgans, in the Southern Urals have been, for

the most part, aerial photographs confirmed by subsequent helicopter flyovers and on-the-ground follow-up inspections (Koryakova and Epimakhov:XVII). The use of other remote-sensing techniques and carrying out pedestrian surveys can possibly lead to the discovery of new sites, thereby altering or adding to our understanding of the region's archaeological heritage. Also, partial excavations or detailed inspections of certain sites listed in the Atlas could help clear up some speculations and assumptions, relied upon in the settlement pattern analysis of the Kyzil Area, thereby providing us with a more accurate picture of the Bronze Age in the Southern Urals.

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Appendices

Appendix A: Attribute data of LBA/FBA sites (total living space and number of housing depressions). Arranged by cumulative living area.

Attributes of LBA-FBA Sites

FID	Shape	HousingDep	Name	Area_sq_m_
79	Point	11	Site4	5852
32	Point	26	Site1	5850
93	Point	32	Site5	5120
55	Point	28	Site2	4950
63	Point	14	Site3	4900
38	Point	21		4600
85	Point	11		4500
13	Point	14		4250
37	Point	21		4235
1	Point	20		4160
71	Point	25		4000
77	Point	7		3600
74	Point	17		3570
15	Point	14		3560
27	Point	18		3520
23	Point	7		3500
26	Point	14		3500
70	Point	16		3300
65	Point	27		3240
0	Point	5		3000
102	Point	17		2975
86	Point	7		2800
83	Point	15		2664
19	Point	16		2650
87	Point	23		2588
8	Point	19		2508
100	Point	20		2500
51	Point	11		2420
76	Point	6		2400
96	Point	15		2400
14	Point	14		2350
72	Point	16		2336
91	Point	18		2208
17	Point	7		2190
41	Point	21		2100
97	Point	17		2018
110	Point	17		2000

	69	Point	11		1990
	22	Point	5		1980
	39	Point	5		1875
	58	Point	11		1750
	59	Point	11		1750
	62	Point	11		1750
	89	Point	11		1750
	99	Point	11		1750
	105	Point	11		1750
	106	Point	11		1750
	107	Point	11		1750
	109	Point	11		1750
	111	Point	11		1750
	112	Point	11		1750
	44	Point	19		1670
	2	Point	8		1600
	18	Point	11		1600
	52	Point	15		1575
	30	Point	8		1560
	82	Point	8		1550
	4	Point	10		1500
	21	Point	6		1350
	29	Point	6		1340
	90	Point	14		1330
	25	Point	6		1312
	42	Point	15		1260
	94	Point	19		1216
	108	Point	20		1200
	88	Point	8		1152
	67	Point	10		1130
	31	Point	11		1100
	28	Point	12		1080
	101	Point	9		1080
	11	Point	10		1040
	45	Point	3		960
	53	Point	8		904

	66	Point	6		900
	9	Point	12		864
	43	Point	7		859
	6	Point	7		848
	10	Point	7		840
	54	Point	10		825
	49	Point	3		820
	84	Point	4		800
	20	Point	11		735
	92	Point	12		728
	64	Point	11		712
	73	Point	6		700
	5	Point	9		693
	57	Point	6		650
	60	Point	6		650
	35	Point	8		640
	33	Point	7		630
	12	Point	4		616
	50	Point	3		607
	103	Point	5		600
	78	Point	6		560
	16	Point	7		530
	24	Point	5		525
	34	Point	5		500
	61	Point	7		500
	7	Point	5		480
	46	Point	5		480
	81	Point	3		480
	75	Point	5		472
	36	Point	5		470
	56	Point	6		450
	95	Point	2		427
	68	Point	14		400
	47	Point	5		384
	80	Point	3		360
	98	Point	3		340
	3	Point	6		324
	48	Point	3		300
	104	Point	1		252
	40	Point	4		200

Appendix B: Attribute data of MBA sites (total living space and number of housing depressions).

Attributes of MBA Fortified Sites

FID	Shape *	Id	HousingDep	Area	Name
0	Point	0	24	1440	Kizilskoe
1	Point	0	30	3825	Sarim-Sakli
2	Point	0	26	4650	Kuysak